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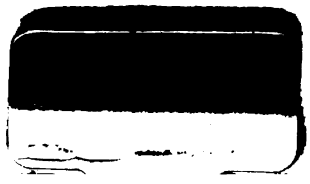

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FIFTH ANNUAL REPORT

OF THE

STATE BOARD

OF

AGRICULTURE,

WITH AN

ABSTRACT OF THE PROCEEDINGS

OF THE

TY AGRICULTURAL SOCIETIES

EAR 1869.

FIFTH ANNUAL REPORT

OF THE

STATE BOARD

OF

AGRICULTURE,

WITH AN

ABSTRACT OF THE PROCEEDINGS

OF THE

COUNTY AGRICULTURAL SOCIETIES

FOR THE YEAR 1869.

EDITED BY CHAS. W. MURTFELDT,
Corresponding Secretary.

JEFFERSON CITY:
Horace Wilcox, Public Printer.
1870.

MEMBERS OF THE BOARD FOR 1870.

Governor JOSEPH W. McCLURG	Ex-officio members.
T. A. PARKER, State Superintendent of Public Schools	
HENRY T. MUDD, President	Kirkwood.
W. S. DYER, M. D., Vice President	Vineland.
W. T. ESSEX, Treasurer	Kirkwood.
GEORGE HUSMANN	Bluffton.
JOHN W. HARRIS	Rockport.
O. H. P. LEAR	Hannibal.
O. A. A. GARDNER	Columbia.
G. W. KINNEY	Snow Hill.
BARNABAS SMITH	Cuba.
H. J. COLMAN	St. Louis.
WM. STARK	Louisiana.
Judge JAMES MOORE	Union.
JOHN H. TICE, Recording Secretary	St. Louis.
C. W. MURTFELDT, Corresponding Secretary	St. Louis.

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NOTICE.

The present is the fifth volume of the Agricultural Reports of Missouri, published under the direction of the State Board of Agriculture. Its contents must speak for themselves. All that is claimed for them and the report is, that it is throughout emphatically a *Missouri Report.* We by no means undervalue the attainments, the skill or the instruction that may be gained from abroad, especially from our neighboring States; but a little of State pride, and the fact, that a report to be of the greatest interest, should emanate, in a great measure at least, from those having experience in our own State, and should shadow forth agriculture and intelligence as it exists among us, have led the Corresponding Secretary to confine himself to papers and reports from active, earnest workers, citizens of Missouri.

It will be noticed that every county report, with perhaps one single exception, has been forwarded to the Corresponding Secretary only upon personal application and request. While he is thankful that these reports have been sent in, he cannot forbear to call attention to the fact, that the law of the State makes it *obligatory* upon the President or Secretary of each county or district society to furnish this office with an annual report of their respective organizations. Because of this fact and also for this other reason, that so few are familiar with the law creating and perpetuating the State Board of Agriculture, the President of the Board has ordered the publication of the entire Acts and By-Laws, relating to the Board, &c., for the information of all to whom these presents may come.

Every County in the State is entitled, if it have a regularly organized Agricultural Society, to representation in the Board at the annual meeting, which takes place the first Wednesday in December of each year.

The law presumes that distinguished farmers, or those most interested in the agricultural advancement of each county, will be chosen

to meet with the Board, either as presidents or delegates from their respective local societies. It presumes farther, that these men will devise, debate and publish such facts as relate to "*the wants, prospects and conditions of the agricultural interests of the State, and to receive the reports of district or county agricultural societies.*" *Notice, if you please, that these reports are due at the annual meeting.*

The State of Missouri has *no* State Agricultural Society. The duties that would appertain to such an institution, devolve upon the Board of Agriculture.

The review of the season is chiefly valuable for reference; and in order that the next volume may be more complete in this respect, the Corresponding Secretary solicts frequent communications upon the conditions of the growing crops of 1870, from every county.

For obvious reasons, the Corresponding Secretary has not in any way altered or interfered with the reports from county societies. There are one or two that may be taken as a guide of what is really desirable in such a report, and we doubt not, the reader will readily discover which they are.

The report of the Reaper Trial at Sedalia, and the Plow Trial at St. Louis, deserves to be carefully perused, because of the conspicuous part which machinery now plays in all agricultural labors.

The apiarian will find valuable hints in the articles contributed by T. R. Allen, A. E. Trabue and W. G. Church, all practical men.

The articles on Farmers' Clubs cannot fail to interest every reader, and are designed to stimulate the formation of such clubs in every town. The social features introduced in many clubs are worthy of special notice. Wherever practicable, their introduction is advised.

"*Cooking Food for Stock*," by A. E. Trabue, will doubtless stimulate others to try experiments, which, if undertaken at all, it is to be hoped will be so carefully conducted as not to leave a doubt. Whether confirming or contradicting Mr. Trabue's conclusions, we hope the results will be furnished to the Corresponding Secretary of the State Board.

Our correspondents will please accept hearty thanks for their contributions offered for this volume, and as we are certain that their interest in their favorite labors as well as in the prosperity and advancement of the State generally, are not abated, we hope to hear from them again and again.

The Addresses of Prof. C. D. Wilber, upon *Mining and Mining Education* (repeated by request) and upon *Iron and Coal*, delivered in the Hall of Representatives, at Jefferson City, February 17th and 18th, 1870, are of such high merit as scientific and literary productions, and so flattering, yet truthful to Missouri, that the Secretary felt constrained to embody them in this report by special permit of Prof. Wilber, (who has reserved the copyright). Many of the Missouri Agricultural Reports are annually sent to Europe and are widely circulated in the United States, and any legitimate means that will set our beloved State and her resources in a fair light before the world needs no apology.

CHAS. W. MURTFELDT,
Corresponding Secretary.

ACKNOWLEDGMENTS OF

AGRICULTURAL REPORTS, PAMPHLETS AND PAPERS FOR 1869.

Reports of Agricultural Bureau, Washington, D. C.
Agricultural Reports in exchange with Maine.
Agricultural Reports in exchange with Massachusetts.
Agricultural Reports in exchange with Connecticut.
Agricultural Reports in exchange with New York.
Agricultural Reports in exchange with Ohio.
Agricultural Reports in exchange with Indiana.
Agricultural Reports in exchange with Michigan.
Agricultural Reports in exchange with Iowa.
Agricultural Reports in exchange with Nebraska.
Daily Missouri Democrat, St. Louis.
Journal of the New York State Agricultural Society, Albany, New York.
Moore's Rural New Yorker, New York.
American Agriculturist, New York.
Cultivator and Country Gentleman, Albany, New York.
Hearth and Home, New York.
Prairie Farmer, Chicago.
Working Farmer, New York.
Horticulturist, New York.

LAWS

RELATING TO

STATE BOARD OF AGRICULTURE.

AN ACT for the Encouragement of Agriculture.

Be it enacted by the General Assembly of the State of Missouri, as follows:

SECTION 1. That George R. Buckner, of St. Charles county, Benjamin P. Clifford, of Pike county, Lucius Salisbury, of Chariton, John Dunn, of Shelby, T. J. Bailey, of Greene, Frederick Munch, of Warren, Richard Gentry, of Pettis, L. D. Morse, of St. Louis, C. C. Manwaring, of Gasconade, and Henry Shaw, of St. Louis, and their successors as hereinafter provided, be and are hereby created a body corporate, under the name and style of the Missouri State Board of Agriculture.

SEC. 2. It shall be the duty of said Board, five of whom shall constitute a quorum, to meet in the city of St. Louis on the second Wednesday of April after the passage of this act, to organize by appointing a president, secretary and treasurer, and such other officers as the said Board shall deem necessary; and also to determine, by lot or otherwise, the time that each member of said Board shall serve, so that the term of service of one-half of the members shall expire annually, on the day of the annual meeting in December, and the president shall have power to call meetings of the Board whenever he may deem it expedient.

SEC. 3. The Missouri State Board of Agriculture, and their successors, when organized as provided by this act, shall have power to adopt such by-laws and make such rules and regulations for the government of said Board and the management of its affairs and business as they may deem best calculated to promote the interests of agriculture, and as shall not be inconsistent with the constitution and laws of the State of Missouri, and of the United States.

SEC. 4. The president of each district or county agricultural or horticultural society organized in this State, or in the absence of the president, the duly authorized delegates of such society shall be *ex-officio* members of the State Board of Agriculture.

SEC. 5. There shall be held in the city of St. Louis on the first Wednesday of December of each year, an annual meeting of the State Board of Agriculture, for the purpose of deliberation and consultation as to the wants, prospects and condition of the agricultural interests of the State, to receive the reports of the district and county societies, and to fill, by election, all vacancies in the State Board of Agriculture.

SEC. 6. It shall be the duty of agricultural societies, established in accordance with an act entitled "an act to authorize and encourage the establishment of agricultural societies in the several counties of the State, and regulate the same," approved November 23, 1855, to report to the Missouri State Board of Agriculture at the annual meeting in the same manner as required by said act to report to the Board of Directors of the Missouri State Agricultural Society then existing.

SEC. 7. It shall be the duty of said Board to make an annual report to the General Assembly of the State, embracing the proceedings of the Board for the past year, and an abstract of the reports and proceeding of the several agricultural societies, as well as a general view of the condition of agriculture throughout the State, accompanied by such recommendations, including especially agricultural education, as they may deem interesting and useful.

SEC. 8. That the sum of one hundred dollars be and is hereby appropriated, out of any money not otherwise appropriated, for the use of the Board, on an account of the expenditures of the Board shall be included in the annual report to the General Assembly.

SEC. 9. The Public Printer shall, annually, under the direction of the president of the State Board of Agriculture and the president of the State Horticultural Society, print and bind, in one volume, three thousand copies of the annual report of the said Board of Agriculture, and the proceedings of the State Horticultural Society; eight hundred copies to be for the use of the Legislature, two hundred for the State Library, one thousand copies for the State Board of Agriculture, and one thousand copies for the State Horticultural Society, for the distribution through the agricultural, horticultural and mechanical associations throughout the State.

SEC. 10. This act to be in force from and after its passage.

Approved December 1, 1863.

Of the Missouri State Board of Agriculture.

SECTION 1. A Board of Agriculture is hereby instituted and created a body corporate, by the name and style of the "Missouri State Board of Agriculture," and by that name shall have perpetual succession, power to sue and be sued, complain and defend in all courts, to make and use a common seal, and to alter the same at pleasure.

SEC. 2. The persons named as corporators of the Missouri State Board of Agriculture heretofore existing, and the duly elected officers thereof, are hereby constituted the officers and members of the Board of Agriculture hereby created, until their successors shall be duly elected and qualified.

SEC. 3. The Missouri State Board of Agriculture shall, at their next annual meeting, in addition to filling the vacancies then occurring, elect two additional members, and the Governor of the State and the Superintendent of Public Schools shall be *ex-officio* members of the Board. Immediately after the State Board of Agriculture has been increased to twelve elected members, as herein provided, said twelve members shall, by themselves and by lot, be divided into three classes of four each, numbered one, two and three. The term of service of class number one shall expire at the annual meeting in 1867; of class number two at the annual meeting in 1868, and of class number three in 1869; and at the annual meeting in 1867 and each annual meeting thereafter, there shall be elected four members, for the term of three years, to fill the vacancies occurring by expiration of term of service; and any vacancies occurring in unexpired terms of service, shall be filled by election for the unexpired term. In case of failure by the president or delegates of county agricultural societies to fill vacancies at the annual meeting, the Board shall have power to fill the same by election.

SEC. 4. The officers of said Board shall be a president, secretary and treasurer, and such other officers as said Board shall deem neccessary, who shall be elected at the annual meeting thereof, and shall serve for one year, and until their successors are duly elected and prepared to enter upon the duties of their respective offices.

SEC. 5. The Missouri State Board of Agriculture, and their successors shall have power to adopt such by-laws and make such rules and regulations for the government of said Board and the management of its affairs and business, as they may deem best calculated to promote the interest of agriculture, and as shall not be inconsistent with the constitution and laws of the State of Missouri and of the United States.

SEC. 6. There shall be held, in the city of St. Louis, on the first Wednesday of December of each year, an annual meeting of the Board of Agriculture, together with the president of each county agricultural society, or other delegates therefrom, duly authorized, who shall, for the time being, be *ex-officio* member of the State Board of Agriculture, for the purpose of deliberation and consultation as to the wants, prospects and conditions of the agricultural interests of the State, to receive the reports of the district and county societies, and to fill, by elections, all vacancies in the State Board of Agriculture. The president, also, shall have power to call meetings of the Board whenever he may deem it expedient, and at any meeting of

said Board seven members thereof shall constitute a quorum for the transaction of business.

SEC. 7. It shall be the duty of all agricultural and horticultural societies, organized and established in accordance with the laws of this State, to make a full report of their transactions to the Missouri State Board of Agriculture, at each annual meeting thereof.

SEC. 8. It shall be the duty of the said Board to make an annual report to the General Assembly of the State, embracing the proceedings of the Board for the past year, and an abstract of the reports and proceedings of the several agricultural and horticultural societies, as well as a general view of the condition of the agriculture and horticulture throughout the State, accompanied by such recommendations including especially such a system of public instruction upon those subjects as may be deemed interesting and useful.

SEC. 9. The sum of one hundred dollars is hereby appropriated out of any money not otherwise appropriated, for the use of the Board, and an account of the expenditures of the Board shall be included in the annual report to the General Assembly.

SEC. 10. The Public Printer shall, annually, under the direction of the president of the State Board of Agriculture, and the president of the State Horticultural Society, print and bind, in one volume, six thousand copies of the annual report of the said Board of Agriculture and the proceedings of the State Horticultural Society, thirty eight hundred copies to be for the use of the General Assembly, two hundred for the State Library, one thousand copies for the State Board of Agriculture, and one thousand copies for the State Horticultural Society, for distribution to the agricultural, horticultural and mechanical associations throughout the State.

Of County Agricultural and Mechanical Societies.

SECTION 8. At each annual meeting of the society the board of directors shall report, in writing, the number of members and the financial condition of their society; the quantity and character of property owned by it, and the quality and cost of improvement of the same; the number and value of premiums awarded at their annual fair; the number and character of animals and articles exhibited; a statement of the probable quantity of the staple commodities of the county, and prices current thereof, and such other information in relation to the agricultural and mechanical interests of the county as they may deem worthy of general notice; and a copy of the report so made shall be transmitted to the Board of Directors of the Missouri State Agricultural Society (Missouri State Board of Agricul-

ture), to be disposed of as provided in the next succeeding section of this chapter.

SEC. 9. The Board of Directors of the Missouri State Agricultural Society (Missouri State Board of Agriculture) shall, at each session of the General Assembly of the State of Missouri, report faithfully all the facts, statistics and information contained in the reports transmitted to them from the county agricultural and mechanical societies organized and incorporated under the provisions of this chapter, and such other facts, statistics and information as they may gather from other counties in this State in regard to agricultural, mechanical and domestic manufactures and productions, and to the raising of the various breeds of stock.

BY-LAWS of Missouri State Board of Agriculture.

SECTION 1. The officers of the Missouri State Board of Agriculture shall consist of a president, vice president, recording secretary, treasurer and corresponding secretary.

SEC. 2. It shall be the duty of the president to preside at the meetings of the Board, to sign all warrants on the treasurer ordered by the Board and to perform such other duties as are or may be required by law. He shall be *ex-officio* chairman of the executive committee. In his absence the vice president shall perform his duties.

SEC. 3. It shall be the duty of the recording secretary to keep and preserve the minutes and records of the Board and the proceedings of the executive committee, to furnish a copy of the same for publication previous to the expiration of his term of service, and to countersign all warrants on the treasurer for money.

SEC. 4. The treasurer shall keep the funds of the Board, and pay all warrants drawn by the order of the Board, signed by the president and countersigned by the secretary, and shall make his report at the annual meeting in December of his receipts and expenditures, from whence received and to whom paid, properly arranged for publication. He shall give bond in such penal sum as may be required by the Board for the faithful performance of his duties and the payment of all moneys in his hands.

SEC. 5. It shall be the duty of the corresponding secretary to conduct all correspondence with societies and individuals, to issue such circulars for obtaining statistics or other information as the Board may direct or as he may deem expedient or useful, to collate and arrange the correspondence, proceedings of the Board, and the proceedings of county societies for report and publication as required by law, and to distribute to county societies and others entitled to

them all seeds, plants, publications, etc., which may be acquired by the Board for distribution. His term of office shall hereafter commence on the first day of February, and continue one year and until his successor is elected.

SEC. 6. The annual election for officers of the Board shall be held as early as possible after the adjournment of the annual December meeting. The officers then elected, except the corresponding secretary, shall hold office from the first of January following, and until their successors are elected.

SEC. 7. The president, vice president and recording secretary shall constitute an executive committee, whose duty it shall be to inspect and audit all accounts, and to perform such other duties as may be required of them in the intervals between the meetings of the Board.

SEC. 8. The necessary expenses of the officers and corporate members in attending meetings of the Board shall be paid out of the treasury.

SEC. 9. The president shall have authority to call special meetings of the Board whenever he may deem it necessary or important to do so.

SEC. 10. Five of the corporate members shall be necessary to constitute a quorum at all meetings except the annual meeting.

SEC. 11. These by-laws may be altered or amended at any time by a majority of the members present and voting, provided that any member proposing to amend the by-laws at any meeting of the Board shall give two weeks' notice prior to said meeting to all the incorporated members, or their successors in office, of such intended motion to amend.

Adopted March 28, 1865.

PROCEEDINGS

OF THE

STATE BOARD OF AGRICULTURE.

OFFICE STATE BOARD OF AGRICULTURE,
ST. LOUIS, August 10, 1869.

Pursuant to a call of the President, the Missouri State Board of Agriculture met at their rooms on Tuesday, the 10th day of August, 1869.

There were present as follows: Col. N. J. Colman, Wm. T. Essex, and Henry T. Mudd, all of St. Louis county; Barnabas Smith, of Crawford county, and Wm. Stark, of Pike county.

There not being a quorum of the members present, on motion, the Board adjourned to meet again on Thursday, September 9, at 10 o'clock A. M.

JOHN H. TICE, *Recording Secretary*.

Thursday, September 9, 1869.

Pursuant to adjournment, the Missouri State Board of Agriculture met at their rooms in the city of St. Louis.

There were present: Col. N. J. Colman, Wm. T. Essex, and Henry T. Mudd, of St. Louis county; O. A. A. Gardner, and J. W. Harris, of Boone county; Barnabas Smith, of Crawford county; Wm. Stark, of Pike county, and his Excellency J. W. McClurg, Governor of the State.

Absent—Dr. W. S. Dyer, of Jefferson county; Gert. Goebel, of Franklin county; George Husmann, of Gasconade county; O. H. P. Lear, of Marion county; and G. C. Swallow, of Boone county.

The Corresponding Secretary, C. W. Murtfeldt, read a lengthy paper, recommending different subjects to the action of the Board for the promotion of agriculture, after which Col. Colman presented the following series of resolutions as embracing the points recommended by the Corresponding Secretary:

1. *Resolved*, That the Corresponding Secretary is hereby authorized to order immediately a field trial of ground stirring and seeding implements duly classified, to be held in St. Louis county, as near the Fair Grounds as possible, and be in the forenoon of each day during the time of the St. Louis Fair, under the auspices of the State Board of Agriculture; the members whereof, with such aid as may be needed, to constitute the awarding committee.

Colonel Colman called attention to the fact that there will be present at the fair, people from all parts of this and the neighboring States, and probably the inventors and manufacturers of the newest and most approved agricultural implements from all parts of the Union would also be present to exhibit their machinery. Now it was utterly impossible from the construction and appearance of a machine to tell how it would operate, and in what manner it would do its work. The contemplated trial would enable them to see both, and to judge of their relative merits, and enable them to form some kind of an opinion at least, whether the machines were adapted to their wants.

President Mudd inquired whether the necessary ground for trial could be had.

The Corresponding Secretary said he had assurances that it could.

The resolution was then adopted.

2. *Resolved*, That the President appoint a committee to carry this resolution into effect.

3. *Resolved*, That the Corresponding Secretary be and is hereby authorized to order a field trial of reapers and mowers and farm implements germain to harvesting generally, to be held under the auspices of the Board during the harvest of 1870.

3. *Resolved*, That the Corresponding Secretary procure the privilege of holding said trial convenient to the city of St. Louis, and near a railroad, and make all other necessary arrangements for said trial.

Colonel Colman said he presumed there would be no objection to these resolutions, as the trial contemplated would cost nothing, provided it was, as is expected, conducted on the Sedalia plan.

The resolutions were then adopted.

5. *Resolved*, That the Board approve of the suggestions of the Corresponding Secretary of holding "farmers' institutes," and the members of this Board pledge themselves to aid every such effort by general attendance and active participation whenever it shall be possible for them to be present.

Mr. Smith: It was said of the last resolutions, that the object contemplated by them could be carried into effect without costing any thing. That is more than can be said of this. My experience has taught me that the amount appropriated would soon be expended if an attempt were made to carry out this resolution. Last winter something of the kind was attempted, not to hold institutes, but to organize agricultural societies in the southwestern parts of the State. He endeavored to get a pass to the different points of meeting without

avail, and after attending meetings in four counties he gave it up, as it took not only his time, but his money. We are working for the promotion and prosperity of the agricultural interest of the State, and prospectively for the commercial and railroad interest. But if willing to devote our time, these grasping railroad monopolies refuse us the paltry favor of transporting us free over these roads while engaged in this work. There is no State in the Union besides where so illiberal a policy is pursued by the railroads. The members and officers of all other State Boards have not only free tickets for special, but for general occasions, so that they can go whenever and wherever they choose, to learn and improve their knowledge of what is going on, or to impart their knowledge and experience to others. But here we have even to pay our own expenses to attend the meetings of the Board. To be sure the Board refunds us the amount of our expenditures, but the money of the Board is wrung out of the hard earnings of the tax-payers. If this resolution is to be carried out, we must ask the Legislature for several thousand dollars more appropriation.

Colonel Colman said he presented the resolution because the Corresponding Secretary desired it, not that he had much faith in its success under present circumstances. The illiberal policy complained of by the member from Crawford no doubt had a retarding and disastrous influence upon the agricultural and horticultural interests of the State. He thought if proper representations were made to the directors of the several railroads, they would inaugurate a more liberal policy, and grant us every needed facility cheerfully; in fact, return to the policy first adopted when this Board was organized, of giving a general free pass to all the members and officers. He knew of several members, and also officers, who for three years had free tickets on all the railroads of the State, yet never availed themselves in a single instance of a free ride, simply because when the organization was new there was no necessity for them of visiting other parts of the State. But to carry out this resolution, would require their presence at given points, and to meet the expenditure we must either have a larger appropriation or free passes over the railroads.

These institutes would be an immense benefit to the agriculturists. Let the farmers be called together and lectures delivered to them by men well learned in agricultural science, like teachers' institutes, but at present he could not see how the Board could undertake them, on account of the necessary expenditure involved.

Mr. Murtfeldt thought that as far as the railroad difficulty was concerned, that the same might be overcome by proper efforts and representations.

Mr. Smith said he would vote for the resolution because it would be a right step in the right direction, but impracticable under our present railroad management. To be consistent, however, as soon as

the question was disposed of, he would offer a resolution to clear the way of obstructions.

The resolution was adopted.

Mr. Smith then offered the following resolution, which was adopted:

Resolved, That a committee of three, of which Governor McClurg shall be chairman, be appointed by the President, to represent to the proper railroad officers the relations in which this Board stand towards the industrial and commercial interests of the State; and ask of them a return to the liberal policy adopted by them at the time when this Board was first organized.

The President appointed Messrs. Smith and Colman the additional members.

Mr. J. W. Harris offered the following resolution:

Resolved, That in the opinion of this Board, the great interests of agriculture, mining and mechanic arts would be promoted by organizing, by acts of the Legislature, district fairs throughout the State.

Mr. Harris said the proposition was so plain and the results so evident as to require no discussion. The only objection to it that could be urged, was that the Legislature would hardly take that favorable view of it as to make the necessary appropriation. He presumed that it would involve some expense; at least, as it probably would be required of this Board, to carry the measure into effect. For places to hold the fairs, he presumed nothing would be required, as competition between localities would avoid that. As there were other expenditures necessary to carry out the work intrusted to the Board, which required a more liberal appropriation is necessary at any rate. The present is a mere pittance, hardly sufficient to keep up the organization of the Board. Only enough is given to remain an organized Board, but never could we become a working Board.

Mr. Colman thought the holding of district fairs had better be left to private enterprise.

Mr. Harris said the object of the resolution was not for the State to hold fairs, but having them held, under the patronage of official authority. This would give such fairs more character than they possibly can have as mere county fairs.

The resolution was then adopted.

Mr. Stark offered the following resolution, with sum in blank, which being filled with two hundred dollars, was adopted:

Resolved, That the Corresponding Secretary procure illustrations (cuts) for the next volume of the Agricultural report to the amount of not exceeding two hundred dollars, if said illustrations are needed for the better understanding of papers contained in the report, or calculated greatly to embellish the same.

Mr. Stark also offered the following resolution:

Resolved, That the Corresponding Secretary be and is hereby authorized to procure so many glass vials as shall be needed to form

a museum of seeds of cereals, grasses, hemp, all manner of garden seeds, &c.

Mr. Stark said he offered the resolution at the request of the Corresponding Secretary. As he understood it only to apply to rare seeds, it would require but little expenditure annually.

Mr. Riley said he should like that, if the Board could afford it, to embrace in it enough for cases of entomological specimens. Thus an entomological cabinet of all the insects in the State would soon spring up, with but little cost.

Mr. Stark said no expenditure of money could be better applied than for the purpose designated by Mr. Riley, and he hoped Mr. Riley would present the matter separately, with an estimate of the amount of expenditure it would involve.

The resolution was then adopted.

Mr. Harris said every step we take towards bringing the Board into a working condition convinced him of the inadequacy of the appropriation. He, therefore, would offer the following resolution:

Resolved, That a committee of five be appointed to lay before the next session of the Legislature the necessity of an increased appropriation for this Board, and urge a larger appropriation.

Resolution adopted, and Messrs. Harris, Colman, Essex, Mudd and Husmann appointed said committee.

A bill for $22 50 for removal and fixtures in new office, was presented and ordered to be paid.

The President laid before the Board two bills of R. P. Studley & Co., one for $63 65 and the other for $275 25, for engravings in the last annual report.

Mr. Mudd said that as the expenditure had not been authorized by any resolution of the Board, the Executive Committee considered they had no authority to audit it. Hence he laid it before the Board for action thereon.

Dr. Morse, ex-Corresponding Secretary, explained the bill.

The subject was discussed by Messrs. Mudd, Colman, Governor McClurg and Gardner.

The ground taken was, principally, that though generally the expenditures were proper, yet that the Board must insist upon retaining all expenditures in its own hands; and, secondly, that the cuts were, to some extent at least, made for and used in the *Journal of Agriculture*, of which Dr. Morse is editor.

Mr. Colman asked if the matter could not be compromised?

The President said he presumed it could by consent of parties.

Dr. Morse said he only represented Studley & Co. so far as to vouch for the correctness of the charges, and as made by his orders. He himself individually would perhaps be held responsible for any deduction made. However, the Board might make what deduction they thought proper, and leave it to Messrs. Studley & Co. to accept or reject.

Mr. Colman then offered the following resolution, which was adopted:

Resolved, That seventy five dollars be deducted from the aggregate amount of the bills presented by R. P. Studley & Co., for engravings, etc.; provided they accept the same and give a receipt in full of all demands.

Mr. Colman offered the following resolution, which was adopted:

Resolved, That the Corresponding Secretary be requested to obtain and keep possession of all the cuts paid for and belonging to the Board, and allow them to be used by other parties if he think proper; but that hereafter all cuts ordered by the Secretary, under the authority of the Board, shall not be used by other parties until they shall have first been used in the annual report of the Board.

On motion, the Board then adjourned.

JOHN H. TICE, *Recording Secretary.*

OFFICE MISSOURI STATE BOARD OF AGRICULTURE,
ST. LOUIS, Wednesday, Dec. 1, 1869.

This being the day fixed by the act of incorporation, for the annual meeting of the Missouri State Board of Agriculture, there were present Norman J. Colman, Wm. T. Essex and Henry T Mudd of St. Louis county; W. S. Dyer of Jefferson county; George Husmann of Montgomery county; O. A. A. Gardner, and J. W. Harris of Boone county; O. H. P. Lear of Marion county; Wm. Stark of Pike county; and Barnabas Smith of Crawford county, of the incorporated members, and John F. Clarkson, President of the Agricultural and Mechanical Association of Boone county; and E. B Snoddy, President of the Agricultural Society of Crawford county, *ex-officio* members.

Absent—Gov. J. W. McClurg and T. A. Parker, *ex-officio* members; Gert. Goebel of Franklin county, and G C. Swallow of Boone county, incorporated members.

Messrs. G. W. Kinney and David G Jones of the Hickory Grove, Warren County Farmers' Club were present, but under the statute could not be admitted as *ex-officio* members.

Reports from officers being in order, J. H. Tice, Recording Secretary, reported the proceedings of the Executive Committee for the fiscal year ending this day, showing that the Executive Committee under the orders and rules and regulation of the Board, had audited accounts and issued warrants on the Treasurer for four thousand six hundred sixty-one and two one-hundredths, ($4.661 02) dollars, which was referred to Committee on Treasurer's Accounts. [For list see Treasurer's Account.]

W. T. Essex, Treasurer, made the following Report, which was referred to O. A. A. Gardner, O. H. P. Lear, and Wm. Stark, as committee for examination.

WM. T. ESSEX, TREASURER, OF STATE BOARD OF AGRICULTURE, IN ACCOUNT WITH STATE BOARD OF AGRICULTURE OF MISSOURI.

Dec. 2,	1868	To balance on hand				$1,791 60
April 21,	1869	To amount received this day from Treasurer of State				5,100 00
Dec. 2,	1868	By B. Smith's expenses	$19 30			
		O. H. P. Lear's expenses	7 00	No. 1		
		J. W. Harris' expenses	9 50		$ 35 80	
	29	C. V. Riley, paid him		2	208 40	
	31	John H. Tice, "		3	6 25	
		L. D. Morse, "		4	120 06	
Jan.	6, 1869	Levering & Webster, rent		5	75 00	
	26	C. V. Riley, paid him		6	208 40	
	31	J. H Tice, "		7	6 25	
Feb.	6	L. D. Morse, "		8	116 96	
	26	C. V Riley, "		9	208 40	
March	6	J. H. Tice, "		10	6 25	
	26	C. V. Riley, "		11	208 40	
	31	J. H. Tice, "		12	6 25	
April	5	Levering & Webster, rent		13	75 00	
	16	L. D. Morse, paid him		14	33 50	
	27	C. V. Riley, "		15	208 40	
May	1	John H Tice, "		16	6 25	
	6	C. W. Murtfeldt, " (3 months)		17	350 00	
	25	C. V. Riley. "		18	208 40	
June	10	John H. Tice, "		19	6 25	
	30	do. "		20	6 25	
		C. V. Riley, "		21	208 40	
		Levering & Webster, paid him		22	75 00	
July	26	C. V. Riley, "		23	208 40	
	30	C. W Murtfeldt, "		24	408 60	
Aug.	2	John H. Tice, "		25	6 25	
	10	B. Smith's expenses, "		26	11 70	
		Mr. Stark, "		27	10 00	
	30	C. V Riley, "		28	208 40	
Sept	2	John H. Tice, "		29	6 25	
	3	C. W. Murtfeldt, "		30	116 67	
	10	B. Smith's expenses, "		31	11 80	
	14	R. P. Studley & Co., "		32	263 90	
		J. W Harris' expenses, "		33	11 00	
		W. Stark, "		34	10 00	
		O. A. A. Gardner, "		35	9 80	
		W. A. Doyles, "		36	22 50	
		N. J. Coleman, " rent		37	75 00	
	30	C. V. Riley, "		38	208 40	
		John H. Tice, "		39	6 25	
Oct.	31	C. V Riley, "		40	208 40	
Nov.	1	John H. Tice, "		41	6 25	
	5	C. W. Murtfeldt, "		42	259 98	
	27	C. V. Riley, "		43	208 40	
					4,661 02	
		To balance on hand			2,230 58	
					$6,891 60	$6,891 60
Dec.	1	To balance on hand this day				$2,230 58

It will require the following amount to pay off, say salaries, rent, &c., to the end of our fiscal year, (April 1st, 1870, the time when we get our annual appropriation).

For Mr. C. V. Riley, 4 months salary		$833 60
Mr. C. W. Murtfeldt, 5 months salary		583 35
Mr. J. H. Tice, 5 months salary		31 25
Office rent, two quarters		150 00
For expenses of members (traveling expenses) estimate		250 00
		$1,848 20
Balance on hand		$2,230 58
Expenses to April 1st, 1870		1,848 20
Leaving a balance then		$ 382 38

In connection with this, my annual report to the Honorable Board, it has occurred to me to make a few brief statements, and offer a few suggestions, which the Board may act upon as they may deem proper.

In the first place, I would like the Board to ask of the Honorable, the Legislature of the State of Missouri, an appropriation of $6,000, for the coming fiscal year, instead of the usual annual amount of $5,100.

My reason for this is, that the salary of our State Entomologist is not adequate for his support, traveling expenses, and for the better illustration of his annual report to this Board. $2,500 will very well do for his salary, and perhaps part of his traveling expenses; but we should give him at least $500 for the engraving of the illustrations necessary to make his report more full and better understood. This would allow him then, $3,000 per annum in full, and I would suggest that any engraved plates, either of wood or metal, shall belong exclusively to this Board, and be first used in the report made to them.

If the gentlemen of the Board were as familiar as myself with the exertions made by our Entomologist, and the time and money spent in expenses in Jefferson City last winter, in getting the additional $3,000 appropriation, I think they would unanimously agree with me in my first remark.

In the second place, I would suggest that the salary of our Honorable Corresponding Secretary be raised to $2,000 per annum, should we get the additional appropriation. Our Secretary, to get the reports from the interior county societies in full, and as they should be published, must necessarily visit most of the county seats, either during the time of their fairs or afterward, the traveling and incidental expenses for which, cost him a good part of his salary. By raising his salary to an adequate amount, would leave it as it now stands, say $1,400 intact for the support of his family, which certainly is small enough, when we expect to get the services, time and talent of a man of practical experience.

This would leave about $1,000 for the office expenses and traveling expenses of the Members of the Board, which I think would be ample enough, and not too much.

All of which is respectfully submitted.

WM. T. ESSEX,

Treasurer of the Board of Agriculture, State of Missouri.

Mr. Murtfeldt, the Corresponding Secretary, read the following report:

To the Honorable, the State Board of Agriculture:

GENTLEMEN: In carefully looking over the records of the annual meetings of the Board, I am unable to find a precedent that a report of the Corresponding Secretary has been submitted at such meeting. Your former Secretary, on one occasion, makes the remark that he

has no report to offer, but that his annual report to the General Assembly and to the Board is in process of construction. May I be permitted to say the same at this time, and to remind the Board that it will be impossible to get the annual report to press before March or April, because the usual legislative proceedings will take precedence. Life and health being spared me, I hope to be ready as soon as the State Printer shall signify his willingness to receive copy for the report, to place the same into his hands. Some valuable contributions have already been received.

There are some very important matters for the consideration of the honorable Board at this present time, and none more so in the opinion of your Secretary than the pending agricultural college bill. Just what is best to do in the premises the united wisdom of the Board will not fail to devise. It would have been a great gratification, I judge, to have had Senator Rollins explain to the Board all the essential points of his bill, which has passed the Senate, and will come up in the House at an early day. May I be permitted to suggest that, if at all possible, a committee composed of members of the Board be appointed this present session, whose duty it shall be to present such resolutions, expressive of the deep interest this honorable Board feels in the establishment of an institution of learning, that shall take high rank among the agricultural colleges of the land, and to back up these resolutions by their personal presence at the capital of the State, by a diligent intercourse with the members of the standing Committee on Agriculture, and in every proper way to aid and secure the munificent grant made to the State by Congress for the establishment of at least one agricultural college in the State.

IMMIGRATION.

Since the called meeting of the Board in September, your Secretary has visited the Southwest portion of the State, and begs leave at this time to refer to only one feature which came under his immediate observation.

In leaving the railroad at Lebanon, the present terminus of the Southwest Branch, the balance of the journey to Jasper county was performed by stage. The more moderate speed of the living animal (in comparison with the iron-horse), furnished better opportunity for observation than one can get from the rear end window of a railroad car. It was surprising to see so many camp fires during the night, and to pass so great a number of emigrant trains during the day. Very rarely one of these was found headed to the east, and if one was so observed it generally contained parties that had only come to view "the goodly land," who would return by and by to make a home in Missouri. But if this was the case between Lebanon and Carthage it was much more so between the latter point and Sedalia. Never, since the great exodus to California, in '49 and '50, was there such immigration into any State as there has been (and is yet) into Missouri in the autumn of 1869.

As much as one can judge in a passing view, and in short snatches of conversation, of the character of these newcomers, for thrift and general intelligence they will compare very favorably with those of any portion of the West or East, for that matter. They hail mostly from Illinois, Minnesota and Iowa, though many come from the Canadas and the East. They are, to a great extent, young men, or men in the prime of life, and are not unfrequently accompanied by the grandsire of the family, whose counsel will be of great value in establishing the "new home," and whose willing hands will still be found active in many a garden or orchard, or doing the chores, while the more vigorous youth shall break up and fence in the land and build the house and barn.

Your Secretary refers to this matter at the present time, only to show the imperative necessity on the part of the State of fostering the great agricultural interests which are paramount to and underlie all others, and to advance by all legitimate means the great material welfare of the farmers of Missouri. This can only be done by "furnishing line upon line and precept upon precept." Here again appears the necessity for the speedy establishment of agricultural schools and of furnishing all the information at the disposal of this office.

According to a resolution passed by the Board at the extra session in September, the Secretary ordered a circular printed inviting competition in a field trial of plows, harrows, cultivators, rollers, and other soil stirring implements, to come off during the fair of the St. Louis Agricultural and Mechanical Association, and on and near the fair grounds. Such a trial was held, and at the time appointed, and the result, if not all that could have been desired, was highly satisfactory. There were twenty-nine bona fide entries, taking all the classes together, while a few entries made by letter, unaccompanied by the usual fee, were ignored by the principals. The current expenses were all covered by the entry fee as per statement herewith submitted, and it will only devolve upon the Board to order the preparation of a certificate of awards, such as shall be creditable alike to the State and to the Board. If the success of this field trial has been such as shall warrant to order a similar one for reapers, mowers, and other harvest machinery, the certificate ordered may be made such as shall be suitable for both trials. To show the importance attached to the trial held during the fair, I beg leave to read a letter from the "Weir Plow Company," and also a formal protest to one of the awards from H. A. Dickson, of Dixon, Illinois. Your Secretary has been assured by other manufacturers (not participants) that had they fairly understood the efforts of this Board, working in their behalf, they would have made any reasonable sacrifice to have been present and contestants.

In requesting the Board at this early day to signify their approval of the holding of a field trial of harvest machinery, it is to give manu-

facturers plenty of time to prepare for the contest, and also to secure the most eligible grounds upon which such a trial, which shall be a real criterion of the true merits of each separate machine, may be held. I am well aware that I shall take upon myself much labor and perhaps some blame, the first I regard as duty, and the latter, if undeserved, cannot harm me. It will take some time to disabuse the public outside of Missouri (and some even in our own State), that the St. Louis Fair is not a State Fair, and that there is at least one State Board of Agriculture that cannot be bribed, but is firmly determined to act honorably in the best interest of the State.

Once more, to show that no prize won short of a field trial of reapers, mowers, etc., is esteemed by the manufacturers themselves, is evidenced by the fact that at their own request many of the State and county fairs offer no premiums for these implements. They exhibit their machines and distribute their advertisements, and there they rest satisfied. And this is wise. How, then, shall or can these very valuable and almost universally used labor-saving machines be tested but in actual field trials.

It does not seem to be generally understood that the State law quoted makes it obligatory upon the officers of county and district agricultural societies to make an annual report to this Board, to be embodied in the annual report of its corresponding secretary. There are present with us to-day ex-officio members, officers or delegates from county societies. May I be allowed to call their attention to this fact, and respectfully request an account—brief if it must be—of their transactions. Besides, it must be evident to the residents of the respective counties that, if they wish to attract immigration, and be esteemed as intelligent and progressive communities, they must make an exhibit of their productions, their industries, their natural advantages, and their general intelligence. In no way can this be better performed than in a faithful and truthful report.

All of which is respectfully submitted.

C. W. MURTFELDT.

On motion the report was referred to a committee consisting of Messrs. Smith, Colman and Harris to consider the same and report thereon.

Reports from county agricultural associations were called for.

The Secretary said he had but one such report as yet.

Mr. Snoddy said the report of the Crawford County Agricultural Association was not ready, but it would be handed in shortly.

On motion, it was resolved that county associations be requested to report on or before the first of March, so as to be inserted in the annual report.

The Corresponding Secretary stated that his annual report had been delayed by unforseen circumstances; and that therefore he had to report that it would be ready as soon as the Public Printer would

be able to commence on the work, which would be probably by the 1st of March.

Mr. Colman offered the following resolution, which was adopted and referred to a committee consisting of Messrs. Colman and ———— ————, after being so amended that the same committee be instructed to attend the session of the Legislature, with the view of obtaining legislation in conformity to such report of said committee as may be submitted to, and adopted by this Board:

Resolved, That a special committee of three be appointed by the President, to take into consideration the subject of the location of the Agricultural and Mechanical College, and make a report at as early a day as practicable.

Mr. Colman said that, as the time for adjournment till after dinner had arrived, he would like to have the time fixed for the election of members to fill vacancies by expiration of time of service. He preferred it should be first in order at the afternoon session, and he would therefore move a resolution to that effect.

The President stated that it had been the general custom to take up the filling of vacancies as the last order of business of the annual meeting; and unless the Board made an order to the contrary, he would rule that it be last business in regular order.

On motion of Mr. Gardner, a recess was taken until half-past one o'clock P. M.

AFTERNOON SESSION.

Mr. Colman, from the committee appointed in the forenoon, made the following report, which was accepted and the resolution adopted:

The special committee, to whom was referred the special report of the Corresponding Secretary, beg leave to report that they have had the same under consideration, and so far as the protest of Henry A. Dickson, to the award of the committee which tried the walking cultivators at the late field trial of plows and other soil-stirring implements, authorized by this Board, is concerned, your committee would respectfully report that the protest, to be valid, should have been made at the time of the trial, and that the Board cannot now go behind the action of the awarding committee.

The committee reported the following resolution:

Resolved, That this meeting approve of the action of the Board on September 9th, instructing the Corresponding Secretary of this Board to take the necessary preliminary steps for holding a field trial of reapers, mowers and other harvesting machinery during the harvest of 1870; that said trial be held as near the city of St. Louis as suitable ground and crops can be secured, and that he give publicity to the action of the Board authorizing such trial under the direction of the State Board of Agriculture.

All of which is respectfully submitted.

R. SMITH, *Chairman*.

Mr. Gardner, from the Committee on Treasurer's Account, made the following report, which was accepted, and the accompanying resolution adopted:

The committee to whom the Treasurer's report was submitted, beg leave to report: They find the account correct, so far as they can tell, and that the accounts of warrants issued by the President and paid by the Treasurer correspond. In regard to the suggestions made by the Treasurer, we beg leave to offer the following resolution:

Resolved, That the State Board of Agriculture instruct their committee in attendance on the Legislature during the next session to ask an appropriation of the sum of $6,000 for the use of the State Board of Agriculture.

O. A. A. GARDNER.

Mr. Colman: That the Board had better remain in session another day. In order to test the sense of the Board, he would offer the following resolution:

Resolved, That when the Board adjourn it adjourn to meet at 10 o'clock to-morrow in the forenoon.

Mr. Colman, continued: I think that the great interests confided to this Board demand that we should devote more time to their discussion. Persons come here from different parts of the State, and we merely transact ordinary business, and wind up the meeting in a single day. We never could rouse the people and get them interested in our proceedings, or benefit them much, unless we spend more time in discussion. In other States the annual meetings of their State Boards last several days in discussion. The best reports are those of the State of Massachusetts. There the farmers meet and discuss the agricultural matters connected with that State, and they are carefully and fully reported. I would like to have the farmers of Missouri read and see these reports. I would like to have the reports of our State Board fully reported. The farmers of Missouri and the agricultural interests of the State are under a cloud. Why is it that wheat is so low? Why is it that the products of the farmer are so low, and yet all he uses are costly and expensive? It is because the government at Washington fosters a protective tariff. We must not only come here and elect our officers, but we must discuss these great questions. If we are not bold enough to discuss these great questions, let us adjourn and give place to bolder and abler men.

Mr. Smith: I am in favor of adjourning at the shortest period possible, and therefore only want time enough to transact our necessary business. Mr. Colman says we must have more time; and I agree with him, that we will want a great deal more time, if we follow out his programme, and endeavor to run the government as he proposes. I think we had better adjourn instantly and disperse, than undertake such an unwise thing. We have enough to do of work that properly belongs to us, without meddling with political questions. This is a meeting for what? To fill vacancies occasioned by the expiration of the term of service of one-third of our members, to reorganize the

Board for the ensuing year, and to take all the preliminary steps for its efficient working next year. This, above all others, ought to be a meeting for business, and not for general discussion. Every hour the members stay subjects them to additional expense; and by our regulations the personal expenses of members attending the meeting are paid out of our appropriation. Staying here longer than our business imperatively demands, is spending needlessly the people's money, for which we will be held responsible. If we cannot get through with our business this afternoon, and I see we cannot, I will offer an amendment, that when we adjourn we adjourn to meet at 7 o'clock P. M.

Dr. Dyer: Thought that we had better proceed to business than spend our time in discussing questions of adjournment. When we are through with business, adjournment will take care of itself.

Mr. Colman said he brought the matter up because those residing in this county could then send word to their families if they could not go home. As far as he himself was concerned, he did not care whether he spent the evening with his famlly or at the Board; because he could go home after adjournment. But others were not so favorably situated. As for what Mr. Smith had said, he must disclaim all such intentions as were imputed to him. He never would allow this Board to be used as a political club.

Mr. Husmann said if the Board proceeded to business it could get through and adjourn before night. He therefore thought both the resolution and amendment were out of place.

The President said the question was on the amendment of Mr. Smith; which was submitted and declared adopted.

Mr. Lear said the Board had resolved to hold a field trial for harvesting implements. I suppose that it will be necessary to appoint certain committees to carry that resolution into effect; first, a committee to make a scale of points, so that the public could know what was decided at the trial. Now unless this is done the people will be be just as much in the dark after as before the trial. We all want the best machines, and those that are not yet supplied want to know how the varied machines, candidates for public patronage, will stand the ordeal of trial. Not only that, but they want to know in what points they excel. In almost every neighborhood there are machines. These may give satisfaction, yet they may not be all that is desired. In a field trial these will come into competition with others. If they are the best the people will then know what to get; if they are not the best, they will not only know that there are better, but also why they are better. Then again, there is a competent committee necessary to superintend the field trial, and see that justice is done both to the inventors and the public.

I agree with Mr. Colman that we should do something when we meet. And I will further say that the something which we do, should tend to promote the agricultural interests of the State. We cer-

tainly are at the head of the agricultural interests of the State, and if we are not, we ought to be in the front to introduce ideas of progress and improvement in the industrial interests of the State. If we place ourselves in this position, we will not get the people to talk about us. Many farmers are watching us, and think we are not rendering an equivalent to the public for what it costs them. They say if we cannot, or do not do better, the Board ought to be abolished. Hundreds of farmers do not know there is such a Board. If a circus comes into the neighborhood, they all know it, because the circus men advertise and make a noise. Our good works will advertise us, and if we can get the live farmers in each neighborhood to form clubs, and put ourselves in communication with them, they will make noise enough for us. In the Massachusetts reports I find discussions held in various parts of the State, scientific lectures delivered and all subjects interesting to the farmers discussed by experts, such as manuring, rotation in crops, breeding, rearing and feeding stock, methods and costs of making butter and cheese, etc. These are proper subjects for farmers to consider. They inform them not only how to do a thing, but why to do it. They also become informed of the most economical method of doing things. If a farmer ventures into any business to make it a specialty on his farm, if he studies the facts elicited by these discussions, he can in advance tell the cost and the probable results. I should like our Board, if it could afford it, to adopt a similar course. If it lacks the means, and our acts are such as to gain the confidence of the farmers in this State, they will furnish us with all we may need. But if I go on in this way, I will get lost, if I am not already, therefore for fear of straying too far from my track, I move that two committees of five each be appointed, one to make out a schedule of points of the machines, and the other to superintend their trial.

Mr. Smith: I second the motion, so as to get them before the Board. But I am opposed to acting on them now. They are premature. This Board has met to fill vacancies, because the official term of one-third of the members expires with this meeting. When the vacancies are filled, I shall most cheerfully vote for the resolutions.

Mr. Lear: Then I withdraw them for the present.

Mr. Colman: I understand Maj. Rollins is in the city, and as some members wish to hear him explain his bill now pending in the Legislature, I move that he be invited to address this Board on its provisions.

The motion was unanimously carried.

Maj. Rollins then appeared and addressed the meeting at great length upon the bill and the subject of agricultural colleges generally.

Mr. Colman: I hold in my hand, and will now offer the resolutions agreed upon by the majority of the Committee on Agricultural College. I must say that I do not concur in the resolutions, as they are too indefinite. But I will, nevertheless, submit them:

Resolved, That the long delay by the General Assembly to establish an Agricultural College in accordance with the design of the general government, has become dangerous to the security of the grant by the United States government.

Resolved, That we recommend the early action of the General Assembly on the bill or bills now before the Assembly, and that as no other county or individual has offered any inducement, with the exception of Boone county; therefore,

Resolved, That the State Board of Agriculture recommend that Boone county and the State University at Columbia shall be entitled to the first consideration.

Mr. Smith supported the resolutions only because they urged immediate action on the Legislature, as that was necessary. As to this or any other bill that was pending before the Legislature, he should not like to commit himself unless he knew what each contained. In Maj. Rollin's bill the leasing system did not strike him favorably. The southwest, where these agricultural lands lay, was somewhat famous during the war for bushwhackers, who had learned many bad habits. If the lands are leased to them, they would hold the land long enough to steal all the valuable timber on it, and with many acres this is the only intrinsic value they have.

Mr. Colman: The leases will be drawn as carefully as any shrewd landlord would under the circumstances.

Mr. Smith: I don't think any shrewdness in wording a lease will head off a bushwhacker.

Adjourned to half past seven o'clock P. M.

EVENING SESSION, 7½ o'clock.

The Board met pursuant to adjournment.

Present, same as in the afternoon, excepting Messrs. Essex and Husmann, and Mr. Mudd temporarily.

During the temporary absence of the President, Vice President Dyer, presided.

The President stated the question before the Board was the resolutions on Agricultural College reported by the committee.

Mr. Lear: As no one seems disposed to open the discussion, I will state the points that will influence my vote for the resolutions. With the many diversities of opinions about organization and sectional rivalries for the location of the college, we are making no progress, and worse than that, we are in danger of losing Congressional donation. By the provisions of the law, we must in order to avail ourselves of the national grant, do certain specific things within a specified time. On account of the disturbed condition of Missouri and other States at the time of the passage of the law of July, 1862, the time for location and organization of a college has been extended, and we are now approaching the limits of the extended term, and yet we have done nothing. In 1864, the subject was brought up before

the Legislature, and in 1865, by the annual report of this Board, it was brought prominently before the farmers of the State. There you will find the history of the legislation, the objects of the law, its limitations and restrictions, and plans suggested for securing the object contemplated. In fact, all the knowledge to act wisely, intelligently and promptly in the matter that was necessary. Four years have elapsed and nothing has been done. There has been ample time and ample opportunities for counties and individuals to come forward and offer a suitable bonus for the location, yet no county, as far as I know, has made any offer worth considering except Boone. All seem anxious to secure it, yet Boone is the one that has been willing to pay a liberal bonus for the location at Columbia. Upon individuals it will not do to rely, as the past has shown we have no Cornell amongst us. Under the circumstances, he thought it inadvisable to delay the matter longer, for it would defer matters a year at least, if not longer, with no prospective benefit. Delay is dangerous to the whole scheme. Our boys are growing up, and need the instruction that is to be afforded in such an institution. This is my first point. The second point that will influence my vote is, the leasing system proposed in the bill. I think this is the best feature in the bill, though my friend, Mr. Smith, thinks it the worst. He says the lessees would waste and steal the timber, and then abandon the lease. I would ask him whether there is no stealing now? If there is, would we not be more secure under the leasing system than what we are now? If the lessees would steal the timber, we would get something, the rent of the land, which is to be paid yearly in advance, while they remained, now we get nothing and lose the timber besides. Moreover we would have some one, the leasing commissioner, to look after our interest, now we have nobody.

Mr. Mudd having appeared and taken the chair, inquired whether there was anything further to be said on the subject, or whether a vote should be taken on the resolutions.

Mr. Harris: I have only this to say, I think the subject has been sufficiently ventilated, and the sooner we get clear of it the better.

Mr. Smith: Before the adjournment in the afternoon, Mr. Colman thrust himself forward as the special champion of the leasing system. Now, Mr. Colman, knew little about the lands which lay almost exclusively in Southwest Missouri, and less about the habits and disposition of many of the people of that section, if he believed any advantages would result to the pecuniary interests of the college by that system. I have been over a great part of them. Last winter there were from one to five hundred men committing trespasses on these lands, cutting railroad ties, timber, cord wood, and so on. I wrote to members of the Legislature, to Col. Colman, as well as to the *Rural World*, stating what was going on, and asking them to take measures to stop this spoliation. This vandalism is not confined to the agricultural college lands, but extends to the school lands, pub-

lic lands and railroad lands. I called the attention of United States Marshals, railroad and other officials to it, but without effect. He was in favor of memorializing the Legislature to make it felony to trespass on these and other school lands. For this reason he would vote for the resolutions, though not entirely satisfied with their phraseology.

Mr. Colman: I will only detain the Board a few minutes. I am glad that the Board unite in establishing an Agricultural College. Eight years ago the Congress of the United States passed a law donating public lands to the several States for establishing Agricultural Colleges. Under the provision of this law, 330,000 acres accrued to this State. Most of the States already enjoy the benefits of Agricultural Colleges, established by the funds thus provided, but Missouri, the most progressive of all, is lagging behind. We should no longer delay to establish the College for the education of our sons who are growing up. I will not speak of the advantages of education. In this day it is mind that achieves all the results attained in any sphere of life. The age of brute force is gone by; mind governs and controls all. Knowledge and science have become necessities. And no art requires as much knowledge and lays so many sciences under contribution as agriculture. We must be up with the spirit of the age, and cultivate our lands intelligently, and then we will attain the largest and best results for the capital employed.

In reference to the Agricultural College, he had done all that he could do personally, and as a legislator, when a member of the House. He had children growing up, which he wanted to send to such a college. In reference to Mr Smith's charge, he would say that if that gentleman had done one-tenth as much as I have done, he then with propriety might call him a laggard. He had, as a member of the Legislature three years ago, labored to pass a bill, which Mr. Smith did all he could to oppose. He believed if that bill had passed, we would now have no cause to complain of spoliation.

Mr. Mudd, President, said he wished to say a word about the value of these Agricultural College lands. Mr. Southerland, whose opinion as a real estate agent must have great weight, told him that he had made inquiry into the condition and value of these lands, and he had not the least doubt that he could lease, with the privilege of the lessee buying at the fixed valuation within ten years, the whole for five hundred thousand dollars. As to depredations on timber by the lessees, he had no fear of that. As a general thing the absence of timber in an agricultural district is rather a benefit than otherwise. Farmers in a prairie country, as a general thing, are far more prosperous than those residing in a timbered country.

Mr. Murtfeldt said he had lately been out in Southwest Missouri, and he gave it as his opinion that the poorest agricultural land in Jasper county was worth at least five dollars per acre.

The resolutions were then adopted.

Mr. Smith then offered a resolution that a committee of three be appointed to urge upon the Legislature immediate action on the Agritural College question.

Some members stated that as this was the annual meeting for filling vacancies in the Board, it was improper for the meeting to appoint a committee to represent the Board, while one-third of the seats of the members are vacant. Such resolutions would be proper before the Board after it had reorganized after the election to fill vacancies.

Mr. Smith thereupon withdrew his resolution for the present.

Mr. Colman offered the following resolution, which was adopted:

Resolved, That a committee of three be appointed to report topics for discussion at the next annual meeting of this Board, pertaining to the agricultural interests of the State, and that said committee publish such topics in ample time for the consideration of the members before said meeting.

The President appointed Messrs. Colman, Smith and Kinney said committee.

Mr. Colman offered the following resolution:

Resolved, That in the opinion of this Board, the agricultural interests of the State would be greatly advanced by the Legislature passing a law enabling any county in this State, through the action of its county court, or by a vote of the majority of its citizens, to require owners of stock to keep them restrained on their own premises.

The law, Mr. Colman said, would not be unconstitutional; it only applied to counties that want the much-talked-of stock law. Only one-twentieth part of the land cultivated would be required for stock purposes. Under such a law only one-twentieth of the fencing would be required that now is under the present system. The question then is narrowed down to shall we have a stock law, and only make one-twentieth of fence as now required, or shall we have no stock law and fence all the land we cultivate?

Mr. Lear favored such a law. The most wasteful expenditure, and one which kept the farmers poor, was that of fencing and the annual repairs. It is a heavy part of the original investment to fence an eighty acre lot, with two or three necessary cross fences. Rails could not be put up for less than eight or ten dollars per hundred; in some localities as much as fifteen cents per rail is paid. After a few years, rail fences had to be annually overhauled and repaired, so that between the tax gatherer and the fence repairing, but little remained to the farmer. Such a law would not only require less fencing, but as a consequence less timber land. The interest alone on the land necessary to be retained in timber, would go considerably to buying rails, and the annual supply of fuel. He was certain if farmers could foresee all the advantages, they would go for such a law at once.

Mr. Smith: This fence question I have heard discussed for the last twenty-five years. There is another side to it; the improvement of stock. Scrubs would not be propagated, especially scrubs in hogs. There is no question about that. Every raiser of hogs knows how

difficult it is to keep his stock from being contaminated by his neighbors scrubs. This will do away with that nuisance. And I am not sure that I might say the same of cattle also. People in the country have hogs, whether they own land or not. This is a very important question, and every successful hog raiser knows there is nothing equal to clover to bring hogs to their full growth during the summer, and none ought to be wintered except those kept for breeding.

The resolution was then adopted.

On motion of Mr. Harris, the meeting then adjourned to 9 o'clock A. M., to-morrow.

MORNING SESSION.

THURSDAY, December 2, 1869.

The Board met pursuant to adjournment.

Present same as yesterday, excepting Messrs. Harris and Husmann.

Mr. Colman: I will offer for the candid consideration of the Board the following preamble and resolutions:

WHEREAS, There is a just cause of complaint throughout the agricultural sections of our country, on account of the decreasing price of their products in contrast with the increasing cost of their production and transportation to market; and,

WHEREAS, It is at all times fit that a people should examine the economical laws which affect their well-being, and seek reasonable remedies for the evils they suffer; therefore,

Resolved, 1. That in the opinion of this Board, agriculture, as the foundation of all social prosperity, should especially receive the protecting care of the government.

Resolved, 2. That the prosperity of agriculture is primarily connected with freedom of access for its productions to the great markets of the world.

Resolved, 3. That the proper province of government is to open such markets to our agriculturists by removing those restrictions with which the protective system has environed our commerce with foreign nations.

Resolved, 4. That in view of the depressed state of agricultural pursuits, which depression is rapidly pervading other branches of industry, our government is imperatively called upon to reform the present protective tariff by reducing it to a revenue standard and relieving from the operation of the customs tax all those articles which are found by experience to yield little or no revenue.

Mr. Colman: I have been warned not to introduce these resolutions, because they introduce political, and, therefore, party matters in the Board. Now they may be political, but they are surely not party matters. In the Great West no party organization exists of which they are the distinctive measure. In fact, in the whole Mississippi Valley all parties, of every shade and color, are a unit in the condemnation of a protective tariff. Look at Republican newspapers in St. Louis, Chicago, and Cincinnati. Not one of them sustains,

but all oppose a protective tariff. In the country towns it is the same as in the large cities. The Republican newspapers are all on one side, and that is against this abominable tariff, which is grinding the agriculturists to death. As for papers of the party to which I belong, no one claims them as belonging anywhere else but as in opposition to this great iniquity. I, therefore, deny that these resolutions contain party matters. But they are matters that affect immediately our pockets and the prosperity of the agricultural interest of the country. Why is it that it is no longer profitable to raise wheat in the West? Because a protective tariff enhances the price of all the implements the farmer uses and of everything he consumes. Because a protective tariff enhances the price of every article of use and necessity. The laboring man has either to starve or demand an equivalent in enhanced wages to offset the enhanced prices of all he consumes. The bounty that the farmer has to pay to the manufacturer of iron, the bounty on cloth, on salt, all of which go not to the support of the government, but into the pockets of monopolists. These are the causes why every branch of agriculture languishes. None is profitable, and some are ruinous. Agriculture is not alone affected; all branches of business are stagnating, and commerce is paralyzed. Our ships are rotting at the wharves because commerce is prostrated. All this now is caused by measures cunningly devised to swindle the laboring classes out of the proceeds of their honest toil, and fill the purses of bloating monopolists. What is the price of wheat now with your protective tariffs? What is the price of wool? Is not almost every wool-grower in the land prostrate? How was it before 1861? Wool is cheaper now than then. Why do the wool dealers hang to this delusion? Are they not killing sheep in Ohio to feed to the hogs? How is it with the farmers who live on railroads? Owing to the heavy duty on iron, our railroads cost too much to be built. We have iron enough in Missouri to compete with the world on the free trade system. See how it affects freights. The wheat growers on the Hannibal and St. Joseph Railroad say that when they ship their wheat the freights are so great that they have no profits. We can only have prosperity on removing the present tariff system. I have endeavored to show that this tariff is got up to benefit the Eastern manufacturing monopolist. No editor even of the *opposite party* dare deny this in the Mississippi Valley. Should we not ask that this protective system be wiped out, in tones of thunder, and the cry go up: "Down with the monopolists; down with those who fetter our commercial relations."

Mr. Smith: I move to lay these resolutions on the table. Can I get a second?

Dr. Dyer: I second the motion.

Mr. Smith being about to proceed, the President reminded him that a resolution to lay on the table was not debatable.

Mr. Smith: Then I withdraw the resolution, to enable me to give

my reasons for opposing these resolutions. I oppose them for the reason that they are political. Disguise them as we may, if we entertain them the public will hold us responsible for overstepping our sphere and ignoring the object for which this Board was created, and transforming ourselves into a political machine. Why and for what purpose was this Board organized? The answer is found in the name of our organization: "The State Board of Agriculture." We were organized to promote the interests of agriculture, to collect and disseminate information relative to the improvement and progress of agriculture everywhere; to improve our stock, to gain reliable information respecting rare reported improved breeds of domestic animals; how to treat and handle them so as to make this branch profitable, and to give information where valuable breeds can be had; to introduce new seeds and plants into the State, and disseminate information as to use and culture; and moreover to examine minutely all agricultural machines, and improvements claimed on the same, and embody the results of our investigations in our annual report for the benefit of our farmers. This I contend was the sole and exclusive object for which our Board was organized, and topics relative to these are the only ones proper to be considered by us. But here comes Mr. Colman with a question that has for half a century been the division line between political parties. True, there may be some show of sectional unanimity upon it, but that does not take the question out of the arena of politics. I say, let political clubs debate and settle political questions, but keep them out of this Board, and out of every other organizations except where they properly belong. It may be true that a large majority may be found against a protective tariff, so that no distinctive party organization will here be based on that question, yet everybody knows there is no unanimity, but a great diversity of opinions on it. Though those holding adverse opinions to the majority may not be formidable to parties, they may be formidable to us. We have no friends to spare, and if we voluntarily go out and put ourselves in opposition to a minority, they will seize upon our acts as weapons with which to assail us. I believe that Mr. Colman is sincere in his declaration that this shall not have a political bearing, but it nevertheless has, and all the more so from the source these resolutions emanate. I must tell some plain truths that I would not otherwise have told, to show there is a hostile feeling against this Board. This feeling I conceive to be without any just ground, yet this move makes it proper that it should be known. It has often been said to me, by people having a great deal more political zeal than agricultural knowledge: "Smith, your Board of Agriculture there in St. Louis is a mere political machine. You are letting Colman run it, and are advertising his paper all you can as the best in the country. You are fostering a serpent that will either sting or strangle you to death. If this thing of running it for the benefit of one man and of one party is not stopped,

we will wipe out your Board." Our existence is thus threatened, without cause. What will it be with cause such as these resolutions furnish? My advice is, let such subjects alone. The Legislature is jealous of us; let us confine ourselves to agricultural subjects, and let such subjects as those in the resolutions alone. Let there not even be an appearance of evil.

Dr. Dyer: I hope our orator feels better after his delivery, and I hope, since he has got rid of his burden, he will withdraw the resolutions, and not force them to a vote. Whether he knows it or not, he is throwing a firebrand in this Board which will burst up the whole concern. If his better judgment does not induce him to withdraw them, I hope the members of the Board will let them slide out quietly, and confine ourselves to proper questions, and let free trade and all other political complications severely alone.

President Mudd said for the last thirty years he had heard much about protective tariffs and free trade. The whole amounted to about this, when the country was prosperous nobody thought of either, but when all business became prostrated from overtrading, overproduction, or reckless speculation, then the whole cause was laid at the door of the tariff. Take the last eight years, and our history does not furnish a period of equal length of such general prosperity of the farmer as they do. The lively picture of universal ruin and distress painted by Colonel Colman had no existence anywhere excepting in his heated imagination. The fact is undeniable, that the farmers have been getting richer faster than ever before, whatever the cause may have been. But while I differ with several of the gentlemen who think we cannot discuss this question without jeopardizing our existence, I agree with them that it is not proper for us to do so. I for one do not feel competent to do so, because I am not well enough versed in the science of political economy. The protective system certainly had been an advantage to us during the war, and he would not assail it until he was satisfied in his own mind that it was pernicious.

Mr. Colman: I thank Mr. Smith for conceding to me sincerity and pure motives. I disclaim all such intentions, either openly or covertly of running this Board, or of making it a political machine. And as to the threat that we endanger ourselves of being wiped out if we adopt these resolutions, I must say I have a higher and better opinion of the Radical party than the gentlemen themselves have. I do not think they would burst up our little machine. They are too magnanimous for that. As to Mr. Mudd's statement of the present prosperity of farmers, he must demur, for it did not and could not agree with the facts, when labor, implements, and every thing necessary for carrying on farming was fully fifty per cent. higher than ever, and the price of wool, wheat, and corn less in currency than they were in gold in 1860.

The discussion was further continued by Messrs. Smith, Colman, and Stark.

The vote was now taken, which resulted as follows:

Ayes—Messrs. Clarkson, Colman, Essex, Lear, and Stark—5.

Nays—Messrs. Gardner, Smith, and Snoddy—3.

Mr. Mudd did not vote.

Absent—Messrs. Dyer, Goebel, Husmann, Harris, and Swallow.

The resolutions were declared adopted.

Mr. Colman: The Board has immortalized itself.

Mr. Smith: Yes, but I do not believe in that kind of immortality.

Mr. Gardner offered the following resolution, which was adopted:

Resolved, That in the opinion of this Board the presiding officers of the horticultural and grape growers' societies, and regularly organized farmers' clubs of this State should be admitted as *ex-officio* members of this Board, the same as the presidents of agricultural and mechanical societies are now admitted, and we respectfully ask the Legislature to change the law organizing the Board, so as to effect this object.

Mr. Gardner introduced the following resolutions, which were adopted:

1. *Resolved*, That in the death of Benjamin D. Walsh, late State Entomologist of Illinois, and associate editor with Mr. C. V. Riley, our own State Entomologist, the State of Illinois has not only suffered an irreparable loss, but the whole West mourns his death.

2. *Resolved*, That we fully appreciate the manly work and scientific attainments of our lamented friend; and feel that it will be difficult to fill the place made vacant by his demise.

3. *Resolved*, That the condolence and heartfelt sympathies of this Board are tendered to the bereaved widow; and that the Corresponding Secretary be instructed to forward a copy of these resolutions to Mrs. Walsh.

On motion, the Board then proceeded to fill the vacancies created in the Board by the expiration of the term of service of the following gentlemen:

Gert. Goebel, of Franklin county; George Husmann, of Montgomery county; O. H. P. Lear, of Marion county, and Prof. G. C. Swallow, of Boone county.

The President appointed Messrs. Colman and Gardner as tellers.

The first ballot was had to fill the vacancy of Gert. Goebel, of Franklin county.

Mr. Smith nominated Judge James Moore, of Union, Franklin county.

There being no other nomination, the vote stood: for Moore ten votes, being all the votes cast, and he was declared duly elected.

The next ballot was to fill the vacancy occasioned by the expiration of the term of service of George Husmann.

Mr. Gardner said: As Mr. Husmann, who was not present to-day, yesterday asked as a favor to be relieved of further service, and as members living at a distance, like himself, found it often extremely difficult to attend at a mere formal meeting of the Board, yet to secure

a quorum their attendance was necessary; he therefore would nominate Mr. J. M. Jordan, a sound, practical man from the city of St. Louis.

Mr. Colman opposed the nomination of Mr. Jordan, on the ground that it might create sectional jealousy against the Board. He thought that North Missouri was entitled to the member. He therefore nominated George Husmann, of Montgomery county, for re-election.

Mr. Gardner said: As a representative of North Missouri, he could not see the force of the objection. The Board of regular members were merely a kind of executive committee. The true Board was the annual meeting, in which every county could have one representative, if they so desired it, and mould the incorporated members as to carry out their wishes. For the convenience of transacting the necessary routine of business, it is necessary to have these members so situated that a quorum was always sure, without putting members at a distance to both inconvenience and expense. Mr. Jordan every one knew, not only as an active, intelligent horticulturist, but a live man in every sense of the word, and would make a most useful and influential member.

A ballot was had, which resulted as follows:

George Husmann.....5 votes.
J. M. Jordan.....4 votes.

George Husmann having received a majority of the votes cast, was declared duly elected.

The next business in order was the filling of the vacancy occasioned by the expiration of the term of service of O. H. P. Lear.

Mr. Lear was nominated for re-election.

A ballot was had, which resulted as follows: For O. H. P. Lear, 9 votes.

Mr. O. H. P. Lear, of Marion county, having received all the votes cast, was declared duly elected.

The next business in order was to fill the vacancy occasioned by the expiration of the time of service of Prof. G. C. Swallow, of Boone county.

Mr. Colman stated, as Prof. Swallow had removed from the State, he would nominate a gentleman who was present from Warren county, Mr. Geo. W. Kinney.

Mr. Gardner: For reasons already stated, I re-nominate Mr. John M. Jordan, of St. Louis.

A ballot was had, which resulted as follows:

For George W. Kinney.....5 votes.
For John M. Jordan.....4 votes.

Mr. George W. Kinney, of Warren county, having received a ma-

jority of the votes cast, was declared duly elected a member of the Board.

There being no other business, on motion, the annual meeting adjourned *sine die.*

JOHN H. TICE, *Recording Secretary.*

PROCEEDINGS OF THE NEW BOARD.

THURSDAY, December 2, 1869.

The Board met upon call of the President.

The following members were present and answered to their names:

Messrs. N. J. Colman, Wm. T. Essex and Henry T. Mudd, of St. Louis county; Dr. Wm. S. Dyer, of Jefferson county; O. A. A. Gardner, of Boone county; Geo. W. Kinney, of Warren county; O. H. P. Lear, of Marion county; Barnabas Smith, of Crawford county, and Wm. Stark, of Pike county.

Absent—J. W. Harris, of Boone county; George Husmann, of Montgomery county, and Judge James Moore, of Franklin county.

On motion, O. H. P. Lear was appointed President *pro tem.*

The President stated the first thing in order was the election of officers for the ensuing year.

On motion, the Board then proceeded to the election of officers, Messrs. Stark and Gardner acting as tellers.

Ballots were cast successively for the following officers, who were elected without opposition, namely:

President—Henry T. Mudd.

Vice President—Dr. W. S. Dyer.

Treasurer—Wm. T. Essex.

Recording Secretary—John H. Tice.

Corresponding Secretary—C. W. Murtfeldt.

Mr. Smith stated that in consequence of some error on his own part, and of the Corresponding Secretary, Mr. Snoddy, President of the Crawford County Agricultural Society, had incurred expenses to the amount of nine dollars, and he moved that the same be refunded to him as an act of justice. Which motion was adopted.

Mr. Stark offered the following resolution, which was adopted:

Resolved, That the Corresponding Secretary is hereby authorized to fix the entry fee for machines at the intended field trial as follows:

For every self-raking reaper	$10 00
For every reaper as a dropper	10 00
For every hand-raking reaper	10 00
For every other harvester	10 00
For every combined reaper and mower	10 00

For every horse-rake.....$5 00
For every horse hay-fork..... 5 00
For every hay-stacker 5 00

And for any machine or implement, a rate which in his judgment shall be in proportion to above.

Mr. Colman called attention to a basket of dried everlasting flowers, presented by M. G. Kern, of the Central Flora Garden.

On motion, the thanks of the Board were tendered to Mr. Kern for the same.

On motion of Mr. Colman, the Corresponding Secretary was requested to transmit the same to Gov. McClurg, at Jefferson City.

On motion, the Board then adjourned.

JOHN H. TICE, *Recording Secretary.*

Report of Corresponding Secretary.

CORRESPONDING SECRETARY'S REPORT.

BRIEF REVIEW OF THE YEAR 1869.

To the General Assembly of the State of Missouri:

At no time, since Missouri has been designated upon the map of the world as one of the United States of America, has her condition been more favorable in point of general health, prosperity and progress than during the year just closed. This cannot be claimed as the result of chance, but is due to a kind and beneficent Providence, which rules in the affairs of nations and men, and which has so highly favored the commonwealth of Missouri! Happy that people who acknowledge God in all their ways!

The inquiry may be raised how and in what respect have the people of Missouri been especially favored? As already intimated in point of general good health, no epidemic, either among men or animals, has visited our borders; more or less of sickness there has been and always will be, but this has been of a mild type, yielding readily to medical skill and treatment. This may be claimed, and is due in a great measure at least, to a higher intelligence among the masses of the people, and a better understanding of the laws of hygiene, to diet, to the greater consumption of wholesome fruits and vegetables, and the less of unwholesome meats. As farm after farm is cleared up and put under cultivation, those diseases, which owe their origin to miasmatic influences, will gradually disappear. Such at least is an historic fact of all the Western States.

Again, we have been favored by weather, which enabled man to labor during the entire season. The mechanic as well as the farmer, have been busy except during a brief period in the month of August, when the heat was very intense, as we shall notice below, and also during a few days of excessive rains, which interrupted harvest operations.

Again, we have had almost uninterrupted navigation on our great rivers. This has given employment to many, as well as affording cheap transportation for produce, thus giving a great stimulus to commercial enterprise.

Last, though not least, our leading railroads have been extended or completed, while new ones are being pushed forward with great vigor and zeal. Among these improvements, we notice the narrowing of the guage on the *Pacific*, with such consummate skill and energy, that along its entire length, travel was scarcely interrupted at all.

The completion of the *Iron Mountain* Railroad to Belmont, below the mouth of the Ohio river, places St. Louis in communication by rail with all the Southern States.

The several branches of the *North Missouri* Railroad have been extended, and the main line completed to the Iowa State line.

Lastly we notice the vigorous prosecution of the work on the *South Pacific* Railroad, with every assurance, that by April 1st, 1870, Springfield will have been reached by the iron horse.

THE SEASON.

The season of 1869, considered from an agricultural standpoint, has been a very peculiar one, and cannot but teach every close observer some valuable lessons. The preceding winter of 1868 and '69 was not a severe one for this latitude, which may be deduced from the fact, that there was no real necessitated suspension of navigation from St. Louis southward; even the regular trips of the Keokuk packets in the Upper Mississippi were not suspended of necessity. The greatest degree of cold occurred in December (12th) of 1868, the mercury falling to zero.

We were favored by some very fine, bright sunny days during February, which gave promise of an early Spring; these were in turn followed by cold and raw weather in March, of which it may with truth be said: "winter lingered in the lap of Spring."

Upon the whole, the Spring was very cool, moist, backward and protracted. Just here is a point worthy of note for the farmer: just such weather, is very favorable to the growth of all so-called *small grain*. It gives the plant a chance to tiller, or stool out, there is a more gradual maturing of the whole plant, so very desirable to the perfecting of the full grain in the ear. Summer was also propitious to the farmer, fulfilling the promise of Spring, in giving a plump berry to the grain and an abundant harvest. Many sections of our State never had a richer yield. The "hot term" was brief, though exceeding hot while it lasted, the greatest heat being between the 14th and 28th days of August.

Autumn was humid, and at times decidedly wet, especially during the last two weeks of October. The early and damaging frosts of the 26th and 27th of October will be long remembered. The cold was severe, the thermometer falling ten degrees below the freezing point. Much damage resulted to the apple crop, a good share of which was still ungathered. Potatoes though under ground, were greatly damaged, especially in quality, when not totally destroyed.

This should also prove a lesson. It is not safe to leave potatoes undug later than the 18th or 20th of October, in St. Louis county, or north of there.

WINTER WHEAT.

This crop was good (in many sections superior) throughout the State. In certain small and circumscribed localities, complaints of chinch-bug and Hessian fly were heard, but the damage resulting from their depredations, was small, comparatively, though perhaps severe on individuals. Of varieties, the "Early May" and "Tappahanoch" have succeeded best, especially the latter, which is growing much in favor wherever introduced. Notice ought here to be made of the fact, that the aggregate yield of drill-sown wheat much exceeds that sown by hand or broadcast. Such is the observation of the Corresponding Secretary, and he has had occasion to visit many fields during the season, and he assigns the following reasons for such a result: A good drill can distribute the seed more evenly in the *drills*, and also in the *rows*, and it will further regulate and place at an *even depth* in the soil, almost every kernel. Much of the soil of Missouri is clayey, naturally well adapted to the production of wheat; but the action of the frost upon such land will frequently cause it to *spew or heave*, thus throwing out the roots of the wheat plant, when an untimely frost, (even a light one), will take the life of the plant. When a systematic underdrainage shall prevail throughout our State, there will be few complaints of wheat being killed by "heaving." The field roller, when used with sense as to the condition of the land, is well calculated to counteract the heaving on surface drained lands, but by its indiscriminate use, a fruitful field is often turned into a brickyard. Top dressing, even after the plant is well set, with well rotted manure, or a mixture of ashes and lime, or all combined, will be found very beneficial to the wheat crop, and instances are not wanting, where such a course has secured the crops against the ravages of the chinch-bugs.

SPRING WHEAT

is never extensively grown in sections where winter wheat is considered a tolerably sure crop, because of its inferior market value. During the season of 1869, but little was cultivated in this State.

In sections, where from some cause or other, winter wheat cannot be sown, where the land is adapted to wheat and ready prepared the preceding fall to receive the seed, spring wheat may be grown with profit, especially in the three or four northern tiers of counties. The past season was a favorable one for this variety, for general reasons already given, which favored the gradual maturing of the plant, and did not force the "heading out" unduly.

WINTER RYE.

Not much of this cereal is produced in Missouri, while a great deal of it is consumed. The Germans as a mass prefer bread made

from rye, and its nutrition is attested, not only by our best analytic chemists, but also by thousands of sturdy men and women, who consume and prefer it. It may be grown with profit upon lands not naturally rich enough for wheat or barley. No crops of small grain, to be sown year after year upon the same land, will do as well as rye; nothwithstanding, this practice is not recommended, but only stated as a fact.

When flocks of sheep shall have so much increased in our State, that large and succulent winter pasturage shall become a necessity, rye may be sown for this purpose, pastured all winter by the sheep, a process which will much enrich the land, and finally turned under the succeeding Spring in time to allow a crop of corn to follow. Anywhere south of the Missouri river, where snow, if it falls, covers the ground but for a short time, rye would afford fine pasture for colts and young neat cattle as well as sheep.

WINTER BARLEY.

Missouri produces considerable winter barley. On rich, warm rather sandy soil it is a very profitable crop to grow. Its price, for now nearly two years, has been above that of wheat during nearly the entire period. Its harvest comes very early in the season, consequently, when grown in extensive fields it not unfrequently interferes very much with the attention demanded by the growing crops of corn. This last remark is equally true of spring sown barley also. To any one at all acquainted with the immense consumption of beer and ale, not only in our large cities, but throughout the entire West, the constant demand for barley will cease to be a surprise.

OATS.

For years past there has not been harvested in Missouri an oat crop equal in quality and quantity, to that of the year 1869. This is also due to the general reason already assigned, viz: A cool, moist and backward Spring. This still enforces the lesson, that lands designed for small grain of every kind, should be well prepared the preceding Fall. Such lands, if they need stirring (which may be necessitated by rain and frost) in the Spring, should not be again inverted, but simply mellowed and loosened by a cultivator. Lands plowed in the Spring favor the undue production of straw at the expense of the more valuable grain.

CORN.

The most variable crop throughout the entire West, but especially in our State, for the season of 1869, was unquestionably corn. While in some parts (as in the rich bottom lands of the Missouri river) corn was growing luxuriantly, and shoulder high to a man at harvest time, (July 1st), it was in others only a foot high. In one place, a good stand with every hill filled, and in other places a very indifferent stand, and many hills missing entirely. The crops, taking the State

together, is called an average one in Washington Reports, but could the real statistics be obtained, it would be found to be much below the average. Such are the conclusions of the most observing, and they are strengthened by the prevailing price of well fattened animals, and the market price of corn, which has been, and is at this date, relatively higher than that of any of the cereals.

In naturally *cold* lands, the very best of seed-corn is required, and it is feared that the partial failure in many fields, already referred to, is largely owing to the use of poor seed. Let it be remembered that one bushel of good seed-corn, planted in the usual way, viz: Three or four kernels to the hill, and the hills three feet ten inches apart in the rows, *will plant eight acres*. But suppose it only plants *six acres*, the cost of good seed purchased, even at two dollars per bushel, is only 33⅓ cents per acre. No one, who reflects a moment, will run the risk of obtaining only a poor stand, and consequently a poor crop at best, by planting *doubtful* seed-corn. It requires actually *less* labor to cultivate a full than a partial crop. With a good prospect the farmer feels encouraged; otherwise, he is often so disheartened, as to neglect to cultivate a partial crop at all.

HEMP.

The fields near Lexington, where much hemp is raised, were the only ones the Secretary had the opportunity to observe. The stand was very uneven, and in the opinion of experienced hemp growers, did not promise well. Small fields in St. Louis county produced better.

Those familiar with the facts assert that wheat, sown after a crop of hemp or tobacco, yields well, and that wheat is encroaching more and more every year upon the area formerly devoted to the first named staple.

TOBACCO.

This crop is not now nearly as much grown as in former years. Whether this is a reason for its high prices, we leave for others to determine. The October frosts did much damage to the crop of 1869, stocking the market with an inferior article and enhancing the price of medium to good qualities.

COTTON.

That this staple can be grown in Missouri, there is no doubt. As an evidence of the fact, we need only state that there were several competitors for the premiums offered by the St. Louis Agricultural and Mechanical Association for cotton raised in this State. That it can be grown at a profit is yet somewhat problematical, perhaps doubtful. When the cotton producing States shall again return to its almost exclusive cultivation (and they are tending in that direction), even if present prices should be reduced twenty-five per cent., it will

doubtless be more profitable for Missouri farmers to raise corn, pork and mules for the southern market than cotton.

The picking season in Missouri was shortened up rather sudden by the October frosts, which of course diminished the crop. As a matter of experiment it may be well to continue the cultivation of cotton. When manufacturers shall find it to their interest to build cotton factories in Missouri, especially in the southern part of the State, it may be profitable to raise the staple.

GRASS AND HAY.

There has not been a season for many years past that produced a *more* abundant or *less* nutritious crop of grass, than that of 1869. As a consequence, no real fat, well-filled out, number one grass beeves have graced our markets, or our butcher stalls, and complaints have been loud and plenty both of butchers and consumers of meat. Hence we reason, that the frequent rains and cool weather, while favorable to the large development of the blade of grass, was in fact detrimental to its nutritive properties.

In the process of curing grass for hay, the saccharine matter becomes more concentrated, and the grass being of itself riper than would be relished by stock as pasture, improved the quality of the hay to some extent. Nevertheless, if comparative tests could now be made, we believe that even the quality of the hay would be found below the average standard.

Again, the quality of the hay was much impaired by over ripeness of the grass before cutting, as well as by the frequent showers during the time of haying.

Hundreds of thousands of dollars could be saved to the farmers of our State by a more economical mode of stacking and feeding hay. The slovenly and lazy way of allowing all kinds of stock to run to the stacks and help themselves, and thus generally wasting more than they eat, cannot be brought to notice in sufficiently severe terms. It is not unfrequent, that in a backward spring, the same stock suffers for the want of that which their careless owner suffered them to destroy during the previous winter.

SORGHUM.

It is the opinion of our best informed practical men that with sugar at the prices obtaining of late, the production of sirup from the Chinese and African cane is deserving of more attention. Saccharine properties abound in almost every article of daily food, especially in that which is most nutritious and wholesome, and any product which will yield so large a percentage as sirup is certainly deserving of attention.

If the common plantation sugar were selling in our principal markets at from 16 to 20 lbs. for the dollar, it might not be desirable to cultivate sorghum, but when only from 5 to 7 lbs. are to be had for

the same amount, then it may become necessary to inquire how we can aid in the production of the essential element of sugar, if not the article itself.

Experience has demonstrated that a very good quality of sirup can be produced from the Chinese cane (sorghum) and also from some of the varieties of African cane (imphee), at about 50 cents per gallon, and in large quantities even for less. A gallon will weigh from 10 to 12 lbs., and further, that for many culinary purposes it is quite as palatable as brown sugar.

Sanguine men have never lost sight of this matter; have steadily kept on raising the cane, and during the past season have made good sirup. Its value is understood.

The machinery for its manufacture has been bought, and brought into the State at some expense, and will continue to be used. The writer knows, from experience, that to have a barrel of good sirup always on hand is a very convenient thing. Let this valuable household aid not be neglected.

BROOM CORN.

This crop is being cultivated but to a limited extent in our State, as far as the Secretary has had opportunity to observe. That it is worthy of attention and that it may be grown with profit, is evident from the fact, that in certain parts of the United States (the Mohawk Valley, New York, for instance) it is grown to the almost entire exclusion of other crops, grass excepted. The climate and soil of Missouri are well adapted to its growth. The price is very high, ranging from $150 to $200 per ton, for a first-rate article of brush. Manufactured brooms have sold at very high prices also, for the last two years. Any good corn soil and the art to cultivate a crop of corn, will produce a good crop of broom corn. It may be made one of the most profitable productions of our State. Certainly we should raise all that is needed for home consumption.

METEOROLOGICAL MEMORANDA AND BRIEF NOTES.

JANUARY.

Was characterized by a temperature unusually warm and equable for the season, with rain or snow on the 1st, 11th, 14th and 29th, in most cases attended by high winds. The river remained open and there was considerable activity in the produce market. There was but little frost in the ground, and wheat and rye had a very promising appearance.

The following thermometrical tables are compiled from those reported for *Colman's Rural World* by A. Fendler and Miss Maggie Muir, of St. Louis county:

For the week ending January 8th:
Mean of the week, 47° 80.
Maximum on 6th and 7th at 2 P. M., 66°.
Minimum on 5th at 7 A. M., 28°.
Range, 38°.
For the week ending January 15th:
Mean of the week, 34° 77.
Maximum on 13th at 2 P. M., 57°.
Minimum on 10th and 12th at 7 A. M., 20°.
Range, 37°.
For the week ending January 22d:
Mean of the week, 35° 37.
Maximum on 22d at 2 P. M., 54°.
Minimum on 19th at 7 A. M., 22°.
Range, 32°.
For the week ending January 29th:
Mean of the week, 40° 23.
Maximum on 28th at 2 P. M., 64°.
Minimum on 26th at 7 A. M., 21°.
Range, 43°.

FEBRUARY.

This month, from the 1st to the 19th, was unusually warm and spring-like. Southerly winds, frequent showers and bright sunshine drew the frosts from the soil and started vegetation. Grass was in many situations as green and luxuriant as in April. The elm and willow, with many fruit trees and early flowering shrubs, began to put forth their blossoms, plowing and planting began, and everything betokened the advent of spring. But on the 18th, a considerable hurricane from southwest inaugurated a sudden and severe change. The wind shifted to the North, and a long-continued storm of hail and snow succeeded, covering the ground to the depth of three or four inches, and effectually checking all farming and gardening operations, and causing considerable apprehension in regard to the wheat and some of the fruit crops. The weather continued cold and stormy to the end of the month. The variations marked by the thermometer as follows:

For the week ending February 5th:
Mean for the week, 33.°85.
Maximum on 1st, at 2 p. m., 48°.
Minimum on 5th at 7 a. m., 13°.
Range, 35°.
For the week ending February 12th:
Mean of the week, 46.°54.

Maximum on 12th at 2 p. m., 74°.
Minimum on 7th at 7 a. m., 28°.
Range, 46°.
For the week ending February 19th:
Mean of the week, 44.°32.
Maximum on 13th at 2 p. m., 65°.
Minimum on the 16th at 7 a. m., 22°.
Range, 43°.
For the week ending February 26th:
Mean for the week, 26.°99.
Maximum on the 20th at 2 p. m., 43°.
Minimum on 23d at 7 a. m., 9°.
Range, 34°.

MARCH

Opened with storm and a greater degree of cold than had been experienced since December. The ground was frozen and covered with snow until past the middle of the month. Vegetation, which had pushed in February, received a complete, and in some instances, injurious check, and all farming and horticultural pursuits were necessarily suspended. A long, cold equinoctial storm succeeded, in which rain, snow and hail alternated with each other, and with a few gleams of sunshine to the end of the month. Altogether the weather was most unpropitious for the farmer and gardener, and the wheat crop suffered more this month than during the entire winter; this was also the case with many varieties of fruit. A correspondent from Barry, Mo., writes on the 11th, regarding grapes and fruits:

"Catawba, badly killed; Clinton, unhurt; Hartford, about four joints of tips killed; Concord, about two joints of tips killed; N. C. Seedling, about one joint of tips killed; Mary Ann, barely tipped; peaches, about all killed; late winter wheat, very badly frozen out—early sown, in very fair condition. Have not examined apples, pears, cherries and plums. Snow to the depth of three inches fell here last night."

We append thermometrical tables.
For the week ending March 5th:
Mean of the week, 28.°04.
Maximum on the 1st, at 2 p. m., 55°.
Minimum on the 5th, at 7 a. m., 4°.
Range, 51°.
For the week ending March 12th:
Mean of the week, 33.°61.
Maximum on the 12th, at 2 p. m., 60°.
Minimum on the 6th, at 7 a. m., 70°.
Range, 53°.
For the week ending March 19th:
Mean of the week, 35.°28.
Maximum on the 19th, at 2 p. m., 62°.

Minimum on the 15th, at 7 a. m., 14°.
Range, 48°.
For the week ending March 27th:
Mean of the week, 48.°66.
Maximum on the 27th, at 2 p. m., 82°.
Minimum on the 23d, at 7 a. m., 31°.
Range, 51°.

Meteorological table, by A. Fendler, Esq., Allenton, Mo., March, 1869.

Thermometer in open air, in the shade.

7 A. M.	2 P. M.	9 P. M.	Mean of Month.
32.°3	48°.4	36°.5	39°.1

Maximum temperature, 84°.0, on the 27th.
Minimum " 4°.0, on the 5th and 6th.

Range, 80°.0 degrees.

Wet-bulb thermometer:

7 A. M.	2 P. M.	9 P. M.	Mean of Month.
30°.5	40°.5	33°.6	34°.9

Barometer—height reduced to freezing point:

7 A. M.	2 P. M.	9 P. M.	Mean of Month.
29.609	29.554	29.569	29.577

Maximum, 30.038, on the 6th, 7 a. m.
Minimum, 29.097, on the 31st, 9 p. m.

Range, 0.941 inches.

Rain on the 7th, 8th, 9th, 10th, 18th, 19th, 25th, 28th, 31st.
Snow on the 3d, 11th, 14th, 21st and 22d.
Total amount of rain and melted snow, 4.21 inches.
Depth of snow, $1\frac{3}{8}$ inches.

	Average temperature.	Snow.	Rain.
March, 1866,	40°.0	0 inches.	2.97 inches.
March, 1867,	33°.4	$4\frac{1}{2}$ "	2.76 "
March, 1868,	50°.2	$\frac{1}{2}$ "	8.87 "
March, 1869.	39°.1	$1\frac{3}{8}$ "	4.21 "

The mean temperature of January, 1869, was, by 3 degrees, warmer than that of March, 1867, and only $2\frac{1}{2}$ degrees colder than that of March, 1869.

APRIL.

The reputation for capriciousness which, from time out of mind, has attached to the month of April, was unusually well justified this year. There were storms of every variety—wintry snows and sultry showers; sharp frosts and warm, wooing sunshine; keen winds from the North and balmy zephyrs from the South; but, in spite of this equivocal treatment, buds swelled and grass blades stretched their green tips upward, and spring asserted herself.

The wheat crop recovered rapidly from the check it had received in March, and even the peaches were found, in many districts, to be less injured than had been feared, while all kinds of small fruits promised abundance.

From letters received we extract the following as appertaining to this subject.

From Lincoln county, April 1st:

"High W. S. W. wind to day, which is drying up the roads very fast. Wheat is now growing nicely. Early wheat looks well; late not so good, being spewed up badly; the present prospect is favorable for a large crop; this section of country will average from eight to ten acres per man, and labor is scarce; so that some wheat will not be saved, if the crop makes itself good as present prospects. Peaches are all killed here. Apples promise a large crop. Our apple orchards in all this timbered country have been badly bored by the locusts."

From Sturgeon, Mo., April 3d:

"Farmers are complaining somewhat in this vicinity of the backwardness of the spring. A number have finished sowing oats, and are about ready to begin preparing their ground for corn. On April 1st, ground froze to the depth of one or two inches. The sun rose April 3d on the earth clad in snow."

The 19th of this month was memorable for the terrific hail storm which swept over St. Louis county and those adjacent, of which we take the following description from the *Rural World:*

"The week was ushered in with an excessively high temperature, a great amount of swiftly moving clouds and stifling air. On the evening of the 18th, much thunder and lightning in the North. Rain during the night, and quite a shower, with some small hail on the morning of the 19th. The clouds continued increasing in intensity and volume till about 3 P. M., when one of the most awful hail storms began that we have known for years. The hail was small and round at the commencement—then fell like eggs, quite a number averaging 1½x1⅛ inches. Then came an immense shower of irregular masses, mostly round, flattened, with numerous projecting points.

When the danger of injury from them was past, we had about a peck gathered, and the largest was 2⅛x1½ and pointed all round the edge. We have heard of masses as large as a hand falling. Much loss in glass occurred, and the trees were much broken and bruised, and large quantities of the blossoms cut off."

The tables below indicate the variations of the thermometer and barometer.

For the week ending April 3d:

Mean of the week, 48°.42.

Maximum on the 29th, at 2 p. m., 67°.

Minimum on the 3d, at 9 p. m., 31°.

Range, 36°.

For the week ending April 10th:

Mean of the week, 52°.82.

Maximum on the 8th, at 2 p. m., 78°.

Minimum on the 4th, at 7 a. m., 22°.

Range, 56°.

For the week ending April 17th:
Mean of the week, 49°.04.
Maximum on the 17th, 72°.
Minimum on the 11th and 13th. 32°.
Range, 40°.
For the week ending April 24:
Mean of the week, 62°.33.
Maximum on the 18th, 84°.
Minimum on the 21st, 45°.
Range 39°.
For the week ending May 1st:
Mean of the week, 58°.66.
Maximum on the 28th April, 79°.
Minimum on 1st May, 45°.
Range, 34.

Meteorological table, by A. Fendler, Esq., Allenton, Mo., April, 1869:

Thermometer in open air, in the shade.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
48°.0	64°.6	50°.4	54°.3

Maximum temperature 88°.0, on the 18th.
Minimum temperature, 20°.0, on the 4th.

Range, 68°.0.

Wet bulb thermometer.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
44°.0	52°.1	45°.2	47°.1

Barometer—height reduced to freezing point:

7 A. M.	2 P. M.	9 P. M.	Mean of month.
29.463	29.427	29.440	29.443

Maximum, 29.817, on the 4th, 7 a. m.
Minimum, 28.807, on the 19th, 2 p. m.

Range, 1.010 inches.

Rain—10th, 0.38; 12th, 0.03; 16th, 0.09; 18th, 1.80; 19th, 1.88; 20th, 0.28; 25th, 0.19; 26th, 0.03; 30th, 1.28.
Snow on the 4th, 0.06.
Total amount of rain and melted snow, 6.08 inches.
Depth of snow ¼ inch.

	Average temperature.	Snow.	Rain.
April, 1866,	57°.1	0 inches.	3.63 inch.
April, 1867,	55°.0	0 "	0.89 "
April, 1868,	51°.4	0 "	6.05 "
April, 1869,	54°.3	¼ "	6.08 "

MAY

Opened with bright, warm weather, and vegetation progressed rap-

idly, although it was still, by the 15th of the month, somewhat behind former seasons that were considered favorable. The reports from different sections of the State in regard to the fruit and grain crops were, on the whole, very encouraging. A cold rain, which began on the 16th, and a succession of cold nights, were rather detrimental to corn and other late products, but doubtless gave a beneficial check to insect development.

We append a few notes from correspondence:

St. Louis county, May 8th:

"Vineyard planting is going on very extensively; the promise of all kinds of fruit, excepting peaches, passing "good." The wheat looks magnificent; the prospect of the "chinch-bug" being very injurious greatly diminished within the last two months."

From Cape Girardeau, May 18th:

"The army-worm has made its appearance in some localities, and the cut-worm is cutting the young corn off as quick as it comes up. Corn is not all planted; oats are quite small for this time of the year. Peaches all killed; apples and other fruits promise a good crop."

From Lafayette county, Mo., May 25th:

"We had frost about a week ago; have heard of no damage from it. Chinch-bug made its appearance, but fails to create any sensation or uneasiness. Wheat crop very promising, much larger than ever before in this county. Prospect good for all kinds of fruit. My peach trees are too full, but a tremendous rain, accompanied by heavy hail (heavy enough to break window glass), last night between sunset and dark, has perhaps thinned them out to a healthy condition. Corn comes up badly—all the early planting, and some of the later, have to be replanted."

"We have a backward spring for putting in spring crops, though the small grain and grass crops are far enough advanced. The most of the farmers are through planting corn, though there is some considerable talk about its not coming up. The small grain that was sown last fall (wheat and rye) don't look very promising in this vicinity; the winter and the chinch-bug have so much injured some crops that the farmers have plowed up the ground. Oats look fine, and so do the meadows. Peaches are killed. There will be some apples and cherries."

From Audrain county, Mo., May 29th:

"The crops up here, taking all together, are on an average. There is more bad wheat than good; oats and grass look very fine; our corn crops are late, with a bad stand, a great many have to plant over on account of bad seed corn and plowing too wet. We will have a tolerable crop of apples; no peaches worth anything; plenty of cherries; small fruits are fine; grapes promising; of pears, plums and damsons we shall have a fine crop.

Meteorological table, by A. Fendler, Esq., Allenton, Mo., May, 1869:

Thermometer in open air, in the shade.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
55°.9	75°.1	58°.3	63°.1

Maximum temperature, 91°.0, on the 25th.
Minimum temperature, 37°.0, on the 8th.

Range, 54°.0.

Wet bulb thermometer:

7 A. M.	2 P. M.	9 P. M.	Mean of month.
53°.6	62°.4	54°.7	56°.9

Barometer—height reduced to freezing point:

7 A. M.	2 P. M.	9 P. M.	Mean of month.
29.401	29.368	29.383	29.384

Maximum, 29.738, on the 8th, 5 a. m.
Minimum, 28,975, on the 12th, 2 p. m.

Range, 0.763 inches.

Rain— 1st, 0.10; 11th, 1.22; 12th, 0.45; 13th, 0.31; 18th, 0.03; 20th, 0.05; 21st, 0.14; 27th, 0.46; 29th and 30th, 0.95.

Total amount of rain, 3.71 inches.

	Average temperature.	Rain.
May, 1866,	59°.9	3.04 inches.
May, 1867,	59°.5	7.86 "
May, 1868,	65°.1	5.71 "
May, 1869,	63°.1	3.71 "

JUNE

Was characterized by a great number of rain storms, many of them attended by considerable thunder and lightning; the temperature during the early portion of the month was rather low, and even to its close there were but few really warm days. The weather was favorable to the growth of newly set trees, and vines, but the unusual amount of moisture in the atmosphere caused more mildew than had been observed for years, and this, together with the ravages of insects and the difficulties attending cultivation, seriously threatened some of the fruit crops. The meteorologist of the *Rural World* made the following notes on the 14th:

"Great quantities of fungi are to be found in the woods. The willow and wild cherry present peculiar appearances in consequence of the action of a fly on the leaves. The cut-worm, army-worm and other caterpillars are doing considerable damage, and the Colorado potato-beetle is very bad in many places. We have seen where the climbing cut-worm was on trees twenty feet high, and there are indications of its being at work on the grape. How the grape vine can remain healthy amid so much wet is a mystery—the apple crop is being greatly affected thereby."

As the month advanced, the anxiety of farmers and those of kindred interests centered in the rapidly maturing grains and grasses. The cool, damp weather developed an unprecedented growth of straw in the winter wheat, while the heads filled but slowly. Many fields were struck with red rust about the 14th, which it was feared would hinder the perfecting of the berry. The army-worm also made its ap-

pearance in some localities, but came too late to inflict material injury—in fact, by stripping off the rusty blades and leaving the stalk clean, it hastened the ripening, and the effect was, in consequence, rather beneficial than otherwise.

The harvest season, which commenced about the 20th, was very unpropitious. One rain followed another in discouraging succession, and the grain, which was found to be well filled and heavy, was badly tangled and beaten down, rendering the use of reaping and mowing machines very difficult, and requiring much extra and laborious handling, As far as the wheat was harvested, the yield was better than had been anticipated; the same was true of rye and oats, in most localities. Corn had been very much retarded in its growth by the cool, wet weather, many fields having to be entirely re-planted after the middle of the month. As a general rule it had a faded, sickly look, and there was no expectation of its proving an average crop.

We subjoin a few extracts from correspondents in different parts of the State:

June 10th:

"Wheat in Lafayette county is turning out far better than was contemplated, and, if nothing happens the crop between now and harvest, a fair crop will be cut, as more land has been planted than on any previous occasion."

"Wheat in Chariton county, especially the drilled, is looking first-rate. A larger area was sown last fall than ever before, and had the season been as propitious as a year ago, the yield would be immense."

"Wheat in Caldwell county is reported coming out much better than had been expected; an average crop of winter and a full crop of spring wheat is expected."

From Jasper county, June 20th:

"Wheat crops in Jasper county are fair; early sown, very fine. Harvest has already commenced; the majority will be harvested the incoming week. Showery the last few days. Wheat shows some sign of rust, though not injured yet. Oats are doing only moderately well, some heading too low. Corn rather low for the time of the year, on account of so much cool weather. I think, if there is no bad luck, it will make a good crop yet."

From Cass county, June 25th:

"We are now in the midst of the wheat harvest, and the early sown will make a good crop. Spring wheat will be ripe in seven or eight days, with a good yield. Oats generally good. Corn looks well and promises a good crop. New potatoes plenty, and a large crop planted."

From Cape Girardeau county, June 30th:

"The weather has been very warm and sultry for the past two or three days. Harvest has been over for about a week, excepting some late wheat. We have had very cool weather to harvest in, excepting one or two days. Wheat has been better than it has been for a great many years."

Meteorological table, by A. Fendler, Esq., Allenton, Mo., June, 1869:

Thermometer in open air, in the shade.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
62°.8	78°.0	64°.5	68°.4

Maximum temp. 91°.0, on the 19th.
Minimum tem. 44°.0, on the 6th.

Range, 47°.0 degrees.

Wet bulb thermometer.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
61°.4	69°.3	63°.4	64°.7

Barometer—height reduced to freezing point.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
29.541	29.496	29.503	29.513

Maximum, 29.779, on the 7th, 7 a. m.
Minimum, 29.129, on the 13th, 7 a. m.

Range, 0.650 inches.

Rain—3d, 4th, 7th, 8th, 9th, 12th, 13th, 16th, 17th, 20th, 22d, 24th, 27th, 29th and 30th.

Total amount of rain, 8.14 inches.

	Av. temp.	Rain.
June, 1866,	68°.7	3.32 inches.
June, 1867,	73°.0	5.14 inches.
June, 1868,	71°.9	1.67 inches.
June, 1869,	68°.4	8.14 inches.

The past month was an extraordinary wet one.

JULY

Began with a series of showers and with considerable increase in the temperature. Harvesting progressed as best it might under the circumstances. The most interesting themes, not only in commercial circles but with all thinking men and women, were the weather and the crops—the heavy showers and devastating floods, the unusual quantity and fine quality of the grain, and the difficulties attendant upon securing it. The situation throughout the State in relation to the crops may be best gathered from the records below.

From Pike county, Mo., July 1st:

"We have but fairly commenced harvesting, and we can say truly, 'the harvest is great, but the laborers are few.' It rains almost every day, so that we have only been able to put in two days' time out of four this week in harvesting.

"This is the first of July and it will yet take some eight or ten days to get through with wheat harvest here, which is later than usual. The grain seems to be maturing finely."

From Henry county, July 1st:

"Wheat is ripe and a good crop almost in our hands, but we are prevented from harvesting it by heavy rains. Oats and grasses look

excellent in this neighborhood. Corn is very backward for the season, owing to the late spring and wet weather."

From Hannibal:

"The harvest of May wheat began June 28th; Blue stem is ready now (July 2d); heads well filled; no rust as yet. Rain every day and sometimes morning, noon and night. Many fields of corn are so wet that a horse cannot walk across them, yet some have a fair prospect for corn. Oats are fair; grass, good. The apple crop will not be as large as was expected; many varieties are badly scabbed, and others are still dropping."

From New Franklin, July 3d:

"Harvest has commenced in earnest. The grain is quite up to an average, both in quality and quantity. Corn is growing rapidly. Oats promise well. Vegetables and fruit, except peaches, will be abundant."

From Callaway county, July 4th:

"The wheat harvest is now fully under way for the medium, early wheat; and if the weather should keep dry for a few days, the crop will be in the shock. Hay and oats are better than for many years past. Entirely too much rain for corn in some parts of this county."

From the 10th to the 20th the heat was quite oppressive, but a few clear days enabled farmers to get their grain in the shock or stack, with less damage than had been feared. The last week in the month was cool and dry. The estimates made at that time upon the newly garnered crops, pronounced the yield of winter wheat in 1869 the largest and best that had ever been noted in the Mississippi Valley. Oats were also exceedingly fine and beautiful. Spring wheat fell a little behind, but was not by any means a failure. Corn, though making rapid progress, could not be estimated higher than two-thirds of a crop. The hay crop was heavy, but could not be considered of first quality since much of it was badly bleached in curing. Vegetables of all kinds made good growth, and small fruits were unusually plentiful.

Meteorological table, by A. Fendler, Esq., Allenton, Mo., July, 1869.

Thermometer in open air, in the shade.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
68°.0	86°.5	69°.4	74°.6

Maximum temp. 95°.0, on the 13th, 15th, 16th.
Minimum temp. 52°.0, on the 21st, 30th, 5 a m.

Range, 43°.0 degrees.

Wet bulb thermometer.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
66°.7	75°.1	68°.0	69°.9

Barometer—height reduced to freezing point.

7 A. M.	2 P. M.	9 P. M.	Mean of month.
29.535	29.495	29.502	29.511

Maximum, 29.726, on the 31st, 7 a. m

Minimum, 29.333, on the 9th, 9 p. m.

Range, 0.393 inches.

Rain on the 1st, 3d, 7th, 8th, 11th, 17th, 18th and 25th.

Total amount of rain, 1.82 inches.

	Av. tem.	Rain.
July, 1866,	75°.7	4.93 inches.
July, 1867,	75°.5	2.05 inches.
July, 1868,	81°.6	2.30 inches.
July, 1869,	74°.6	1.82 inches.

AUGUST

Opened with beautiful weather—clear, drying, and cool—for the season; excellent weather for stacking and threshing grain, and for securing hay, and was improved everywhere by farmers to the extent of their strength.

About the 14th began the "heated term" of the season—burning suns and sultry showers (few of the latter), and nights in which not a leaf was stirred by the breeze, were the unvarying order of things for more than two weeks. Vegetation of all kinds ripened with surprising rapidity, and even the corn received an impetus in its growth that raised the hopes of farmers in regard to the yield. Fruits of all kinds filled the markets, and plenty crowned the land.

We give the variations of the thermometer from Miss Muir's memoranda:

For the week ending August 7th:
The mean of the week, 74.°75.
Maximum on the 3d and 4th, 92°.
Minimum on the 1st, 61°.
Range, 31°.
For the week ending August 14th:
The mean of the week, 75.°85.
Maximum on the 9th, 13th and 14th, 86°.
Minimum on the 8th, 64°.
Range, 22°.
For the week ending August 21st:
The mean of the week, 83.°14.
Maximum on the 21st, 96°.
Minimum on the 15th and 18th, 74°.
Range, 22°.
For the week ending August 28th:
The mean of the week, 81.°38.
Maximum on the 24th, 94°.
Minimum on the 25th and 26th, 72°.
Range, 22°.

SEPTEMBER.

The temperature from the first to the 13th of this month was rather low than otherwise, and very dry. It was much more favor-

able to the ripening of fruits and corn than to the plowing and harrowing operations necessary to fall seeding.

The very general fears of an early frost were not realized as yet, and such of the duties as still appertained to the garnering and marketing of the harvest returns progressed without interruption, either from storm or extreme heat.

Slight rains on the 15th and 17th were very grateful to vegetation, but not sufficient to put the ground in good condition to plow, and farmers were fearful of being much behind with their work of that kind by the time of severe frost.

The latter portion of the month was unseasonably chilly and changeable. The first frost, which was slight and only observable on low grounds, occurred on the 27th.

Below will be found the weekly variations of the thermometer:

For the week ending September 4th:
The mean of the week, 70.°23.
Maximum on the 31st, 81°.
Minimum on the 3d, 58°.
Range, 23°.

For the week ending September 11th:
The mean of the week, 68.°04.
Maximum on the 5th, 83°.
Minimum on the 8th, 53°.
Range, 30°.

For the week ending September 18th:
The mean of the week, 70.°90.
Maximum on the 12th and 18th, 36°.
Minimum on the 14th, 60th°.
Range, 26°.

OCTOBER

Came in with bright skies and a degree of warmth just suited to the holiday season of the autumnal fairs, and farmers and their families seemed very generally inclined to avail themselves of the recreation these exhibitions afforded.

The "dry spell" still continued, greatly retarding fall plowing and planting, and the temperature gradually decreased until the 16th, when occurred the first general frost of the season, much later than usual. From this time onward the weather was of a perfectly anomalous character for the season and the latitude. Instead of the warm, hazy airs of Indian summer, which every one anticipated, we had a series of fierce storms, of sleet and snow covering the ground to the depth of three or four inches, and remaining on for many days, while the cold was severe. Thousand of bushels of potatoes were frozen up in the earth, and the wealth of innumerable apple orchards, the fruit of which the owners had delayed to gather, was rendered almost worthless in a night. The severe cold of the 24th and 25th of Octo-

ber, 1869, and the extensive damage resulting from it, will long render those days memorable. On the 27th the temperature increased, and the snow and ice began to disappear, and in the sun one felt decidedly warm.

Thermometrical observations as follows, for the week ending October 2d:

The mean of the week, 58.°37.
Maximum on the 30th, 80°.
Minimum on the 26th, 42°.
Range, 38°.
For the week ending October 9th:
The mean of the week, 57.°99.
Maximum on the 8th, 79°.
Minimum on the 3d, 5th and 9th, 42°.
Range, 37°.
For the week ending October 16th:
Mean of the week, 49.°99.
Maximum on the 10th, 70°.
Minimum on the 16th, 31°.
Range, 39°.
For the week ending October 23d:
The mean of the week, 39.°09.
Maximum on the 17th, 62°.
Minimum on the 23d, 25°.
Range, 37°.
For the week ending October 30th:
Mean of the week, 38°.47.
Maximum on the 28th, 66°.
Minimum on the 24th and 25th, 16°.
Range, 50°.

NOVEMBER.

This was truly a month of "melancholy days." Cold and clouds were the rule, sunshine the rare exception. All field labors were out of the question. The roads were extremely heavy, rendering the marketing of grain, the drawing of wood or lumber, or building materials of any kind very arduous work for man and beast. Even the work of building itself was everywhere interrupted by the continuous rains and snows, and without warning or giving time for needful preparation. Winter usurped the reins of government and opened a particularly brisk campaign. Very little tree planting could be done. The grain fields were much injured by the lack of sunshine and the severe frosts. Stock of all kinds required unusual attention to prevent their losing flesh in the very beginning of the cold season.

We clip the following from our exchanges, and cannot help thinking from the irregularity of the weather that it will be a hard matter

to keep the run of the snows this season. We have noticed snow and no snow, ice and unfrozen mud, within three miles of each other. That this is a general feature of the season, we conclude from the following:

"NUMBER FIVE.—Five from thirteen leaves eight—more snow storms yet to come. If the Weather King continues to send them as fast as he has since the first snow fell, we are thinking the number will be filled before the close of 1869."—Jefferson County (Mo.) Democrat.

"MORE SNOW.—Monday night and Tuesday morning last this latitude was favored with another snow, two inches in depth, more or less. During the week considerable rain has fallen also. We learn that there was no snow at Westphalia, eleven miles distant, and that there was none seen on the road closer than about four miles this side of there."—Linn County (Mo.) Democrat, 20th.

For the week ending November 6th:
Mean of the week, 49°.8.
Maximum on the 1st and 2d, 74°.
Minimum on the 31st, 18°.
Range, 56°.
For the week ending November 13th:
Mean of the week, 35.°38.
Maximum on the 9th, 44°.
Minimum on the 11th, 28°.
Range, 16°.
For the week ending November 20th:
Mean of the week, 36.°09.
Maximum on the 18th, 52°.
Minimum on the 20th, 26°.
Range, 26°.
For the week ending November 27th:
Mean of the week, 41°.85.
Maximum on the 22d, 54°.
Minimum on the 21st, 29°.
Range, 25°.

DECEMBER

Made its debut with the same sullen, tearful face with which its predecessor had bade us farewell. The cold was not severe, but the saturated air was chilling and unhealthy in the extreme. Rain, snow and sleet alternated with each other almost through the entire month, which, taken in connection with November, gave us seven weeks in which the sun shone brightly but for two or three days. The gloomy aspect of nature seemed to be reflected in every circle, commercial and social, and a general dullness prevailed. About the 20th the wind shifted sharp around into the west, and the curtain of clouds was once more swept aside and the bright face of the sun beamed cheeringly upon us. From this time to the end of the month the weather continued pleasant.

For the week ending December 4th:
Mean of the week, 41°.66.
Maximum on the 29th, 61°.
Minimum on the 1st, 28°.
Range, 38°.

THE REAPER AND MOWER TRIAL AT SEDALIA, MISSOURI.

The following account of the field trial at Sedalia was originally written for and published in the *Rural World* by the Corresponding Secretary:

The Pettis County Agricultural Society determined to have a field trial of Reapers and Mowers—none having been held in Missouri for some years past, and never so extensive a one as the present. This was eminently desirable, because, in no department of labor-saving machinery have there been made so many and valuable improvements, during late years, as in these implements. There are so many and such desirable machines in market now, that those who have really no intrinsic merit, or have not been able to keep up with the march of improvement, will soon be weeded out. Our State opens up so large and desirable a field for implement makers, that it is no more than right that an opportunity to judge for themselves should be given to the farmers to obtain, or form an intelligent opinion, as to the actual merits or demerits, of the several machines claiming their patronage.

Manufacturers of standing are always willing to grant all such requests—in fact, they are like the thorough-bred horse (pardon the *simile*—ever ready for the contest, and seem to relish the excitement—they smell the battle. They are, in a certain sense, men of one idea, they have the reaper on the brain, and, considering the immense fortunes that have been made by the manufacture of reapers, they are furnished with pretty strong reasons for the faith that is in them. Is it any wonder, then, that to-day *forty* machines, in various combinations, came to the scratch—every one (its backers or manufacturers) sure of laurels?

It was determined by the committee, to put all the self-rakers on trial, first. The field chosen was that of Mr. Wm. Williams, about two-and-one-half miles southeast of Sedalia, the crop being *May* (winter) *wheat*, and the first raised on the ground. The land, a good, rich prairie loam. The field gently sloped to the southeast, and towards that point the grain was a rather thin stand, while towards the northwest, the growth was strong, straw being long enough to require only a single band; the average product we judge about twenty bushels per acre. The white grub had worked on the roots of

the wheat to some extent, hence much of the straw was leaning and easily uprooted; and, had the season been dry, early and warm, there would, no doubt, have been a partial failure—as it was, the damage was not very serious. In such a field, and in like condition, any machine worthy a shade of consideration ought to work, hence, we do not consider the first day's trial any test at all.

We are of opinion that, were the Pettis County Agricultural Society to order another trial, some things, in which experience is only a sure guide, would be altered—and here we disclaim any disposition to be captious. For instance: a committee of three, or at most, five, would have been much easier to handle and give a satisfactory award. Second, much time would have been saved by having the surveys made before hand, and the work cut out, both in reaping and mowing. Next, each machine should have had to cut its acre or half acre complete, and have the time noted; also, the wear of the machine, the hindrances observed, etc. We have really no intention to find fault, yet these points obtrude themselves, and we cannot help writing; we hope some, if not all, may be obviated before the contest closes.

The first machine to start was *Champion No.* 1, a single-wheel machine; it seemed to work easy for the horses, and do its work well. The acre was not finished by this machine, but completed by *Champion No.* 2, a two-wheeled machine, which is the one generally and favorable known, and put on the market in the West, by Swan, Ogden & Co., general agents. This seemed to be somewhat the favorite, and did fair work as a self-raker; but we think better, even, as a "dropper." We had never seen any dropper operate, and were very much and favorably impressed. It leaves the bundle with the butts even, laying across the swath; can be approached from either side by half face movement, and is easily gathered by a move of the foot.

The second machine to start, was, *Wood's* made by Walter A. Wood, of Hoosick Falls, New York. In this grain the machine worked well, but in a severer trial the second day, in tangled and trodden grain, it did not sustain its reputation—choking four times in one round; nevertheless, the *Wood* is quite a favorite among machines. The motion and construction of its rake is very different from any other in the trial.

The third machine was the *Kirby*, manufactured by D. M. Osborne & Co., of Auburn, New York., and exhibited by Dick Ransom, of St. Louis, general agent. The machine claims (or rather its manufacturers) that, having a good, reliable self-rake, the dropper is "played out." We certainly agree, that the rake is a good one, and in the tangled grain did the best of any machine on trial. Altogether, he who buys a *Kirby*, has a reliable machine. See (frontispiece.)

The fourth machine was the *Auburn Harvester*, which did not, on this and subsequent trials, furnish us with any strong points for commendation.

The fifth was the *Marsh Harvester*, carrying with it the crowd of men, women and children, attracted by the novelty of seeing two men, while riding on a platform of the machine, receive the grain from an endless apron, bind the bundles as fast as received, and leave the grain ready for the shocker. Everybody seem anxious to see the binders clogged—and, "whip up the horses," "keep them a going," etc., was the cry; not only from the lookers-on, but from the marshal himself, who actually whipped the team until the movement was almost—some say quite—a trot, and much faster than the other teams traveled, and yet the men bound the grain. *Two good binders* without the excitement of a machine trial and in their own or neighbor's field, *can* bind the grain, have the sheaves of more uniform size, and leave the whole in good condition at night—in fact, *safe* against almost every calamity, if the shocks are well set up. Seeing this is the first time we ever saw the *Marsh* in the field, we can conscientiously say, we like it much. It does not seem liable to get out of order easily, and has made many friends on this occasion. Of course it is not a mower, and was not entered as such.

On the second day, in the morning, the combined machines were tried with the drop attachment. We should mention here that the surveys stopped at the third or fourth machine, and there was a great deal of extra work performed, some machines going once or twice around the entire piece; others had but a slim chance before the committee in consequence. Among those who left the grain in perfect order by the use of the "dropper," were the *Champion*, the *Dodge*, the *Russell*, (made at Massillon, Ohio,) and the *John P. Manny*, (made at Rockford, Illinois). The *New York Clipper* and *Cayuga Chief* did fair work.

In the afternoon, a piece of wheat had been selected (on the place of Dr. Martin, joining the first field), which was heavy and lodged; it was further tangled by men, horses and carriages running and driving through in every direction, and then the machines were set to work. We have already hinted at the result, and will comment no more, only reiterating that this was the only real test and hard spot; only two or three machines came out of this trial with any laurels. No one expects a machine to straighten out the bundles much; while every farmer wants a machine that will cut and save even down and tangled grain.

The third and last day, the machines were tried as mowers. While we shall give the names and prices, we may be allowed to say that most of these are sold as mowers only when required, with one or two exceptions—by purchasing the extras any one can be converted into a reaper, dropper, or self-raker. It was supposed that a little old grass would prove a serious obstacle, and give the machines a hard task. Not so; all worked well. In fact, this was no test trial at all, according to our notion of things. Of course some machines worked easier and some harder. A six feet cut *Champion*, for in-

stance, was drawn and worked by a single mule—his mate simply assisting in holding up the yoke, while his traces were unhitched, working well even at a very slow pace.

All the following were entered as combined machines, except the *Young Warrior*, which came to the contest only as a mower.

The World, as a mower, cut four feet six inches; with all combinations, price $230.

The Dodge, as a mower, cut four feet five inches; all combined, $210.

The Kirby, as a mower, cut four feet ten inches; combined, $140; self-rake, extra, $40.

The Wood, as a mower, cut four feet; self-rake, combined, $200.

The Excelsior, as a mower, cut four feet six inches; combined, $185.

The Cayuga Chief, as a mower, cut four feet two inches; combined, as dropper and mower, $160.

The Auburn Harvester, as a mower, cut four feet eight inches; self-rake and mower combined, $180.

The Champion, as a mower, cut five feet and six inches; self-rake combined, $215; dropper and mower, $190.

The John P. Manny, as a mower, cut five feet; combined hand raker and mower, $160; dropper, extra, $20.

The Clipper, as a mower, cut five feet; reaper, mower and dropper combined, $190.

The Young Warrior, as a mower, costs $125.

At the present writing, the result of the trial, as far as the committee is concerned, is not known—when it is we will publish it.

It may be presumptuous in us to send forth our own verdict. Let it be understood that it is only the opinion of an humble individual. The verdict of so large and intelligent a committee will have more force.

The committee consisted of the following gentlemen, members of the Pettis County Agricultural Society: Major W. Gentry, President; Dr. Tobias, Secretary; Wm. Paff, Chas. Walker, J. B. McClure, J. T. Phillips, George Anderson, Wm. M. Gentry, J. N. Snead, and H. J. McCormick.

The agricultural society charged an entry fee of sixty dollars for every machine in every combination, or fifteen dollars for every separate combination—we believe; and, though they worked hard, they will save (if we are correctly informed) about *five hundred dollars* for the society. Four of the contestants united in paying $20 an acre for the down-trodden wheat. In justice to Dr. Martin, we must say, that they would have paid him $30—but the Dr. thought that too much. How it was saved, we hope to learn from the Dr. at no distant day.

On the first day, perhaps three hundred farmers and their wives were present; but there was a great falling off in attendance the sec-

ond day, and on the last day there were still less, owing to the busy season of the year."

The Corresponding Secretary of the State Board has failed, even after personal request, to obtain a report from the Secretary of the Pettis County Agricultural Society, which would have been given in place of this.

FIELD TRIAL OF PLOWS, SEEDERS, CORN-PLANTERS, ROLLERS AND HARROWS.

According to the resolutions passed by the State Board of Agriculture, the Corresponding Secretary prepared and issued the following circular:

The very great interest manifested by the Farmers in Field Trials of Harvest Machinery, during the season of 1869, has induced the State Board of Agriculture of Missouri to order a field trial of soil-stirring, seeding and planting implements, to be holden at St. Louis, as near the Fair Grounds as possible (on the morning of each day), during the Fair, to wit: October 4th, 5th, 6th, 7th, and 8th, in the following order:

First day, 9 A. M.—Class I, breaking and sub-soil plows.

Second day, 9 A. M.—Class II, old ground, trench and gang plows.

Third day, 9 A. M.—Class III, seed drills, broadcast seeders and corn planters.

Fourth day, 9 A. M.—Class IV, short plows, riding and walking cultivators and rollers.

Fifth day, 9 A. M.—Class V, any new soil-stirring implement not enumerated or classified in the preceding.

REGULATIONS.

1. The implements entered for competition must be such as are ordinarily sold by the manufacturer.

2. All competitors not ready to take their places when their number is called, may be ruled out, at the option of the Board.

3. Competitors are required to furnish their own teams and plow-men or operators.

4. Competitors are required to furnish their own seed grain.

5. All entries must be made on the day previous to the trial of each respective class.

6. An entry fee of two dollars will be charged for each separate entry.

7. There will be a first and second award for each subdivision in each class, to wit: the certificate of the Board.

8. To facilitate the necessary preliminary arrangements, entries should be made at as early a date as possible.

The books are now open. Address, Charles W. Murtfeldt, Corresponding Secretary, No. 612 North Fifth street, St. Louis.

Editors and Publishers to whom this circular may be sent will confer a favor by giving the same publicity.

THE TRIAL.

The Board having duly considered the importance of regular field trials for the more important implements used on the farm, as the only reliable proof of their practical utility, entered upon the trial with spirit. The manufacturers responded in sufficient numbers to give interest to the trial. Even Ohio, Michigan, and New York manufacturers, who had faith in the implements which they offered to the public, entered the list.

The trial, as a first effort, must be considered a success. Not only was competition good, but the implements offered were of superior workmanship and merit, and had it not been for the adoption of a scale of points upon which to decide the merits of the several machines, it would have been impossible in some instances to have made a decision at all.

Great credit is due to the President of the Board, Hon. Henry T. Mudd, for his indefatigable attentions and the rare ability with which the awarding committees were selected. Also to the gentlemen serving on these committees for their close scrutiny and unbiased judgment, as well as their patience and labor to bring the trial to a successful issue.

The scale of *Points* adopted to aid the several committees in their decisions was as follows:

Quality of work	20
Ease of draft	10
Cost	5
Total	35

FIRST DAY.

The first trial was for *Breaking Plows*, and took place on the well known St. Louis Fair Grounds, the management generously granting the privilege. Five competitors were ready, and came to the test, which was spirited, and although some contended that only one class of plows could strictly compete, namely: prairie breaking plows, yet as there was no distinction made in the circular, all were allowed to enter, and after a severe trial the first award was given to F. T. Woodford, Utica, New York; the second to the Industrial Plow Manufacturing Company of St. Louis.

Committee.—Henry Clay Hart, Chairman, St. Louis; Colonel M. M. Bain, Mississippi; David Thomas, Missouri; Barnabas Smith, William Stark, Missouri, members of the State Board.

Subsoil Plows, according to the technical significance of the term, were not entered, and, hence, no trial had.

SECOND DAY.

The weather seemed to favor the exhibition. Quite a number of farmers and manufacturers attended outside of the Fair Grounds.

The trial for Gang Plows was held on the second day in a market garden, in soil that was very mellow and deep. Clover sod would no doubt have been more acceptable to the competitors, but the Board wisely considered that it was not to be an easy, but a *severe* test. Out of four entries, three came to the trial. They all worked admirably and well. When the committee were satisfied, they gave the first premium to Robert Newton, of Jerseyville, Ill. (We understand that there are several hundred of these plows in Jersey and adjoining counties, busily employed in turning over the prairies.) The second premium was given to Doyle & Curtis, of Bradford, Stark county, Illinois.

The Old-Ground Plows, or rather their makers, also thought that a stubble field would have furnished a better place to try the plows; the Board thought that market gardens must, of necessity, also be plowed, and ordered them forward. At it they went; the plows were set to go beam-deep, and mules and horses got all they wanted in a few rounds. That piece of land was never so well plowed; but we can get the evidence only in next year's crop. The first premium was given to the Industrial Plow Company of St. Louis; the second to Dodge, Kimball & Austins, of Kalamazoo, Mich.

The following names are the gentlemen that served on this committee:

Chairman, O. A. A. Gardner, Columbia, Mo., Barnabas Smith, Crawford county, members of the Board; T. Sappington, St. Louis; Charles A. Mularow, St. Louis; Isaiah Jones, St. Louis.

THIRD DAY.

Of *Seed Drills* only two were entered. The well and favorably known "Buckeye Drill," manufactured at Springfield, Ohio, and sold by Barnum Brothers, St. Louis, obtained the first award. The second was given to Seigel & Smith, of Carlinville, Ill. The price of the machine is $85.

Five machines were entered as *Corn Planters*. The first award was given to the "Vandiver Corn Planter" (see illustration), entered by Joshua Wood & Co., Quincy, Ill. (This planter also took the premium of the St. Louis Agricultural and Mechanical Association.) We think it of sufficient importance to give the claims set up by this planter.

"We claim for the "Vandiver" decided advantages over all other Planters, among which we guarantee most positively:

"It is lighter of draft than any other Planter, as it runs on four wheels, having gauge wheels forward which serves to balance the Planter, so that the tongue plays in the neck-yoke, causing no weight on the horse's neck, even though the heaviest man ride as operator.

"It will plant deep or shallow, as may be desired, perfectly and

with certainty, these extra wheels forward being easily raised or lowered for that purpose.

"It works free on the hinges, so as to accommodate itself perfectly to all unevenness of ground, the gauge wheel serving to regulate the depth of the runners, at the same time obviating the necessity of using a stiff frame to accomplish this purpose, and doing the work more perfectly and with greater ease to the horses, as well as doing away entirely with the plunging which characterizes machines with stiff frames.

"The opening at the heel of the runners is of a width sufficient to allow the corn to scatter in the hill instead of dropping in a bunch, as is the case with other Planters having the narrow openings. We are enabled to use this wide opening in consequence of coverers (or little plows) being connected with the Planter by hinge attachments,

VANDIVER CORN PLANTER.

thus actually covering the corn, and not depending upon the wheels to accomplish this work as do all other Planters. This ingenious attachment is so contrived as to make the "little plows" perfect coverers, as it forces them to raise as the runners fall, and fall as the runners raise. It also capacitates them to jump over any obstacle that would tend to clog them—as would be the case if they were a stiff coverer—without retarding the progress of, or interfering in the least particular with the workings of the machine, or any part thereof. It also makes them act as cultivators, destroying all weeds that may have started prior to planting five inches each side of the row, forming a ridge above the main level, which is immediately pressed by the deep concave wheels, on top and each side. By this means all washing of the corn is prevented, turning the rain in wet, and holding the moisture in a dry season, and allowing the operator to plant the corn very shallow, if need be, and yet very thoroughly cover it.

"The drop plate is very simple, and can be readily gauged to drop more or less seed in a hill, by simply changing the slide.

"The "Vandiver Planter" has a drill attachment for drilling, and sod attachment for planting the toughest prairie sod, either of which

can be added by the farmer at any time in the field. These attachments are extra, and must be paid for as such, and can be procured of our agents, or by sending to the manufactory.

"The "Vandiver" is supplied with a flexible cut off, which performs its work with perfect certainty, and which we guarantee will never injure a grain of corn in planting.

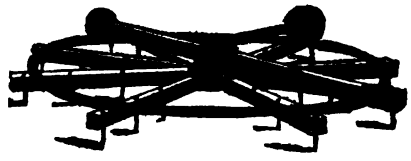
"It is the most perfect, complete, and reliable corn planter in use, and we fully warrant it in every particular, and only ask for a trial of the machine."

The second award was made to Haworth & Son, Decatur, Ill. This last has an ingenious device, consisting of a cord and pullies, by which any piece of ground can be planted in *checkrow* without first marking it out, thus saving much labor.

Committee.—Judge P. S. Lanham, Chairman, St. Louis; Thomas E. Breckenridge, St. Louis; B. Smith, Cuba, Crawford county, Missouri; Jonathan Huggins, Macoupin county, Illinois; Philip L. Tippett, Mississippi.

THIRD DAY.

The trial commenced with *Harrows*, and a strong competition. There were seven entries, one of which would doubtless have received an award if entered as a new implement, being in fact a roller and harrow combined, not, however, working on the generally recognized principle of a harrow, but rather on that of a roller or pulverizer. On this ground it was ruled out, and the first award given to *Monroe's Improved Rotary Harrow.* (See illustration.) This har-



row adjusts itself to any surface of land, and clears itself by its rotary motion.

The report of a committee of the "*New York Farmers' Club*" we deem of sufficient interest to insert here.

"We went to the farm of Mr. Davis, near White Plains, and there met Mr. Monroe, the inventor. We saw a device resembling a large cartwheel laid horizontally. The spokes are ten in number, made of white oak, 3x3, and each armed with three harrow teeth. The hub, or axle, into which they fit is a single casting, and through the centre runs a strong kingbolt, to which a bar is attached. On one end of bar is a small wheel running around on a narrow iron track near the outer end of the tooth spokes; at the other end is the clevis. In addition to this is a cast-iron wheel of twenty-five pounds weight so connected with the kingbolt as to revolve near the outer edge at right angles with the clevis beam. The effect of this wheel is to weight one side of the harrow, producing greater resistance, as the teeth thus weighted sink deeper. This unequal bearing on the two sides of the wheel harrow give a rotating motion, combined with the for-

ward motion, without loss of power. A sliding weight is so adjusted as to increase or lessen the bearing of this wheel at pleasure. The test to which we subjected the invention was severe. The field was a roughly turned sod, with grass sprouting high from the edge of each furrow-slice. There were some bushes, some loose stones, some fast stones, while a copious rain falling all the morning made the surface muddy where not greasy.

"A careful observation of the style in which this implement did its work has convinced your committee:

"1. That, by giving the plowmen of America such a help for fine tillage as they have in this rotating harrow, Mr. Monroe deserves the thanks of farm laborers and farm horses.

"2. We think his harrows going once over a surface will accomplish as much as any other harrow going three times over. As the direction of the rotation is easily controlled, it can, in harrowing, move always from the back to the upper edge of the furrow-slice.

"3. No sod need be upturned by its action.

"4. The rotating motion allows the implement to clear itself of anything that will clog harrow teeth and free itself from a stump or fast rock. No lifting is called for, and the draught is uniform upon the team.

"5. The teeth wear out alike.

"6. This implement does not operate as well with the slow movement of oxen.

"7. The inventor acts wisely in selling the castings for a small sum, and not requiring every purchaser to take a complete harrow or nothing. With the castings and a set of harrow teeth, any farmer expert enough to shape a good plow-handle, can get out the timber and frame this harrow in his workshop.

"8. Your committee specially commend to the attention of farmers any implement the use of which will make the mixing of soils and fineness of tilth easy and cheap. Few fields are as thoroughly prepared for grain crops as they should be. By the use of this and similar improvements in tillage the crops of the country might be greatly increased."

Committee.—J. B. Lyman, S. E. Todd, W. S. Carpenter.

FOURTH DAY.

The interest of the implement trial was well maintained. *Riding Two-horse Cultivators* were first tried. Ohio and Illinois again in the lead. The ground upon which these implements were tried was not all that could have been desired, being the same that was used on the first day for the breaking plows. An actual field of standing (growing) corn would have been better, yet the committee felt well satisfied in making the awards. The first to Thomas & Mast, Springfield, Ohio, the second to James Armstrong, Elmira, Illinois.

Walking Two-horse Cultivators were next in order, and in this class several first-class implements were offered. After a severe trial the first award was made to *Weir Plow Company*, of Monmouth, Ill. (See illustration.) The manufacturers claim for this corn plow:

1. Its simplicity and durability of construction.

2. The peculiar twist of the Diamond Shovels, by means of which dirt can be throwns to or from the corn, without the gangs crowding.

3. The patent square frame, and the arrangement of the knuckles, which keeps the gangs in an exact vertical position, and the same

WEIR'S CORN PLOW.

time allows the gangs to have free and easy lateral and vertical motion without that lopping of the gangs so common with nearly all other Double Corn Plows.

4. The set and form of shovels, which makes it run deeper than any other implement of the kind yet constructed.

5. The draft being on a direct line from the shovels to the horses' necks, the point of the tongue and wheels are relieved of all downward pressure.

The first award for *Double and Tripple Shovel Plows* was made to the Industrial Plow Company of St. Louis.

J. W. Dilly was awarded the first prize on a *Section Self-adjusting Field Roller*, while for a similar implement the second award was made to O. B. Colcord, of Greenville, Ill. Both rollers worked admirably. One was made (in the main) of wood, the other of iron, and this difference decided the committee in favor of the more lasting material. One such implement should be found on every farm in the State.

Committee—Wm. Stark, chairman, Pike county, Mo., member of Missouri State Board of Agriculture; Sam'l W. Bayles, St. Louis; P. H. Fulkerson, St. Charles.

The Industrial Plow Company offered for trial a *Trench Plow*. This plow is made to follow in the same furrow of a common plow, thus running twice or more of the usual depth. It is a very strong tool, of which the committee please to say that it is admirably adapted for the purpose intended, and decidedly the best they have ever tested.

Committee—Dr. H. Claggett, St. Louis; Michael Schipler, St. Louis; Asa Loudon, St. Louis.

As far as the Board of Agriculture has been able to judge or ascertain, the awards have given general satisfaction, and when it is noticed that some of the most important prizes were carried out of the State of Missouri, the charge so frequently made of such trials, namely, that of partiality to home manufactured articles, falls to the ground.

It should not be passed over, that a great deal too much time was (and is generally) consumed by *tinkering*. Why manufacturers will put in jeopardy a premium which they, of right, esteem very highly, by entering a contest without having previously tried every bolt and screw on their implements, is very hard to understand. Many of the exhibitors wanted time to scour the plows, or to try them separately, etc., etc., all of which diminished the time which should have been allotted to actual trial. But notwithstanding all this, none of the gentlemen of the various committees would hesitate to recommend any of the implements that came of victorious in this trial. In fact, it is worthy of special notice that every implement offered was a good one, and in several cases only a few, and in one even a half point decided the committee. Disappointments there will be at such trials, but it is not much of a vantage to be beaten only by half a point, and a great deal of satisfaction to have been in competition with a first-class implement.

THE TEXTILE FABRIC AND WOOL EXPOSITION AT CINCINNATI.

Having been named on the Committee on Wools, the Corresponding Secretary repaired to Cincinnati, and makes this brief report:

For years it has been the cry of the West and South, that capital and skilled labor were all they needed to develop their inexhaustible resources. Well, we will leave out the inexhaustible, and substitute magnificent, natural resources—for such both the South and the West possess. As for skilled labor and capital, they are finding their way Westward with very perceptible increase of speed every year. We are not unfamiliar with the efforts made by woolen mills and factories, as seen at the different State fairs.

The present exposition, of which we have undertaken to speak, eclipsed all former efforts that it has been our pleasure to see, not only in point of magnitude, but also in the quality of the goods exposed. Surely skilled labor is in our midst *now*, if this be an index. Of course we have the raw material, and our capital is on the increase and being rapidly augmented.

Why should the West and the South send their wool, cotton, hemp, flax and hides to New England to be manufactured; send along the bread and meat to sustain the operatives; pay all the expenses of handling, transportation, insurance, commissions; pay for manufacturing, a profit to the capitalists, and all return expenses in buying back the goods made? Still more, why should they send their cotton to old England and France, with all the incidental expenses as above, *only more so*, and purchase back the manufactured goods? Or, in the words of Judge Bellamy Storer:

"But the manufacturers of the West present a thought which is full of abiding interest to you all. Why should we be tributary to England or any other portion of the world? Why should we regard ourselves as bound to import from any part of this, our hemisphere, let it be the Eastern or Western, any article necessary for use, or that is just and proper to be used? It is said, however, that we cannot manufacture as cheap here. My pride is humbled when I know that a pound of cotton is sent over to Europe and it comes back to us in perhaps one or two yards of gossamer texture. Who pays the duty? We pay the broker who buys the cotton. We pay the insurance upon it. We pay the commission in Manchester or Birmingham. We pay the freights over here. Then we pay to him who imports another duty upon it; and by the time it arrives here, it is very much like the shawls which cost $15 that our own manufacturers can furnish for $8."

This was the old time rule; but our Eastern friends may as well make up their minds to come West, and bring their skilled workmen and capital along; and they had better be quick about it, too, or the "coming Johnny," from China, will get here first.

At this exhibition we saw and handled fabrics of wool and cotton

in the way of meltons, cassimeres, jeans, blankets, domestic cottons, cotton and wool blankets, etc., that would be very hard to beat in any market. Thread (cotton), made for the use of sewing machines, unsurpassed by any other. Silk-sewings and twist, made from the finest imported raw China silk, and equal to the old established Italian brand of "Rubinacci"—even, elastic, and of beautiful lustre. Very soon California will furnish raw silk. The West is bound to be the manufacturing centre of this goodly land; or, as a gentleman at the exhibition had it: "Let us of the Northwest manufacture the woolen goods, and the South the cotton goods"—and we say *Amen.*

But, the question is often asked, why will our American nation import English, French and German goods, when, as we have proven, we can make goods equal in every respect? Let us tell you one reason, and take it in the spirit in which it is written: Whenever a *taking style* of goods is imported—say fancy cassimere, or fancy lawns, or any other ladies dress goods—from England, some sharp Yankee will immediately imitate it, and so closely that is difficult to mark the difference; it continues "to take." Now, he will set his wits to work to make an article that will look as well, but has not the wear in it; and so, the standard is lowered by every new piece—that is what makes the buyer shy. Foreign manufacturers cannot afford to do this; they must keep up their reputation or go down. Americans make the same goods under a dozen different brands at the same mill, if it suits their schemes. If all were as careful that their fabrics should be of uniform quality, as, for instance, the York Mills, they might not get rich so fast, but there would not be a shadow of a doubt of ultimate great success. We could hope that especially our southern factories would raise their standards high, and keep the goods up to the mark. The domestics exhibited by them at this time were highly creditable, and as firm and solid as could be desired; we hope that very soon we shall see, also, some very fine prints made at the South, and made as honest, both for color and texture, as were those domestics and jeans.

But is it not a little singular that the wool-growers of the Northwest are so shy of the manufacturers? Have they any more reason than for the farmer to be shy of the miller, or of the drover or butcher? Will not supply and demand regulate their affairs as well? Must the wool-grower take, without allowance, all that the manufacturer asserts, as to the amount of wool on hand? We think not. A wool-grower should keep posted—and we have never known one that did not (for they are sharp chaps, too sharp perhaps)—and then sell his clip when he is ready, or when the figures suit him. For example: A friend of ours fattens half a dozen steers every season; they are *stall* fed; when fat, he lets it be known; he fixes his price, of course referring to the conditions of the general markets; then, if a buyer comes, he gives his figures, and he will obtain that amount or the oxen remain in his stalls. What is to hinder the wool-grower from giving his

figures either to the buyer or to his commission merchant, and acting like our friend?

Men are selfish, there is no denying that fact. If they buy, they will get their purchase as cheap as they can; if they sell, they want to sell for the most money, and hire their labor at the lowest rate: or as Mr. Stebbins, of Detroit, one of the speakers, had it:

"Manufacturers must give employ to many persons. In 1860, the eleven Northwestern States had over 225,000 men and women working in mills and factories of all kinds, and turned out $390,000,000 worth of their products. This has largely increased since. In 1865, Massachusetts alone employed 225,000 persons in the same way, and turned out over $400,000,000 worth (of woolens, $45,000,000), and their farm products were over $100,000,000, on a thin soil, increasing in ten years, more, in proportion, than those of the factory; and showing the benefit of having the farm and factory neighbors, as they should be with us, and must be, for the best good of purse and soil and soul among our own people.

The women and girls of Massachusetts earn yearly $25,000,000 in factories, and can command respect, meanwhile, by womanly character and conduct. No small item, this, in these days when women are looking for self-support and independence.

I am not here to settle this labor question, or to say that either employers or employed are all right or all wrong. A mean man will be mean, be he rich or poor, and an honorable man is "a man for a' that," as Burns says, whether he is rich or poor. But I can gladly say that the working people of this country are the best paid, all things considered, of any in the world.

But some people say your manufacturers are "bloated monopolists." That is bad.

I have a list of two hundred and thirty firms in New York city, in the thirty-second revenue district, whose sales, largely of imported goods, exceed $100,000 a month, and fourteen firms in that city report yearly sales, counting up $140,000,000. A. T. Stewart, a well-known importer, gives his income at over $3,000,000; larger than that of any half-dozen companies of manufacturers in the land. For the capital invested, manufacturers must employ twenty times as many persons as these traders. I do not call these men "monopolists;" but if they are not, I can't see how you are, and you have less chance to be, as there are more of you, and more competition.

In 1860, the eleven Northwestern States had $900,000,000 of farm products to consume and sell. How much did manufacturing Europe, England and the Continent take of us? Only some $13,000,000 worth. How much did 22,000,000 of our customers, East and South, in the Union, buy? Some $190,000,000, or sixty-fold as much per head. But these foreign countries sent us $200,000,000 worth of their manufactures. Great Britain sent to the West $45,000,000 of her wares—buying little and selling us much."

We cannot close this necessarily brief account without referring explicitly to the beautiful, tasty and comfortable shawls, manufactured by Blake & Co., of the Racine Woolen Mills, called the "Badger State Shawls;" and they are the same so flatteringly referred to in his address by Judge Bellamy Storer. One, a beautiful scarlet plaid, was declared to be every way equal to any ever made in Scotland, and no wonder, when they have that canny little Scot, R. Street, for superin-

tendent. Some one has said: It is a pity that a Scotchman should ever be wrong, for they are so hard to turn. We suppose that it is the same when they are *right*, only more so. Judging from this, the goods made at this mill will soon acquire a repute in their specific line equal to the celebrated York Mills. Messrs. Blake & Co., make, also, double and twisted cassimeres, meltons and blankets. We congratulate them upon their success.

The Prairie State shawls, manufactured by the Lacon Woolen Manufacturing Company, Marshall county, Illinois, were equal to the first, and in twenty different patterns; and we could, with propriety, repeat all said above. They deserved and received the premium for the best low-priced shawls.

P. H. & F. M. Roots, manufacturers, of Connorsville, Indiana, had on exhibition sixteen pieces of fancy cassimeres of a very superior quality, and, we think, of more complicated patterns than any we laid our eyes upon; also four pieces of meltons, that any duke might be proud to wear. These goods were not made expressly for this exhibition, but are the honest offerings of their salesroom, where they can be duplicated any day. The manufacturers cannot supply the demand, and we do not wonder at it. Why not enlarge your works, gentlemen? Only keep up the standard as hitherto, and success is yours, and no such word as fail.

The Lawrenceburgh, Indiana, Woolen Mills made a most excellent exhibition. Nearly sixty pieces of various qualities of meltons, cassimeres, doeskins, blankets, and a variety of woolen goods of the very best quality and modern styles, were entered by them. To think of merchants traveling to Boston or New York to lay in goods, when such an assortment is spread before them in their immediate vicinity, seems preposterous, unless a man is determined to verify the old adage, "far fetched and dear bought." This company has been very successful with their show of goods at various State fairs, as the different medals awarded them amply certify. We hope to see them at the Illinois State fair, but more especially at the St. Louis fair, and have no doubt they will carry off many prizes. *Their goods are kept up to a number one standard.*

Surely skilled labor and capital are now in the Northwest, and this includes Georgia, South Carolina, Mississippi, and even California.

Only two pieces of bagging were sent from Missouri. No wools from this State, and but few from any State. We think wool-growers, as such, were ignored by the manufacturers.

NOXIOUS WEEDS.

BY THE EDITOR.

At the annual meeting of the Board the subject of *noxious weeds* was referred to. Members seemed to agree that it was very important that farmers should be better posted. Our lands are so fertile that where no good crops grow weeds will spring up. The Secretary, therefore, offers the following, originally written by him for the *Rural World*. Would that the teachers of our common schools were sufficiently versed in botany to make these cormorant pests object lessons for their classes, so that our youth might early become acquainted with them. Lands can be kept free from them, and although the fields of the slovenly farmer will produce seed enough for the entire neighborhood, yet no good farmer will allow weeds to go to seed on his premises.

What are weeds? We have consulted books and asked writers, and the best definition to our mind, we can give or get, is this: "Plants out of place." But our purpose will be better subserved if we speak of noxious weeds; because, under the first designation, a stool of rye in a wheat field, or a stool of oats in a barley field, would be classed as weeds—they are undoubtedly plants out of place. Noxious weeds, however, are such plants as are not only out of place, but have no general worth or use, and that multiply so rapidly that they appropriate all the space a careless farmer will allow them to occupy. No good farmer, deserving that name, will allow them to occupy the ground. We must cry shame, too, on the blotches we so frequently see in fields, often right in the midst and on the very best soil on the farm; where, because weeds are in the majority, and wheat or oats not in sufficient quantity, the weeds are left standing, allowed to mature their seeds, and spread them all around—and this, with the knowledge and consent of the owner or occupant. Weeds can and should be kept under, if not in one way, then, in another; if not with the hoe, then with the scythe or plow. They appropriate plant food that should go to nourish useful plants.

The article on Horse Nettle in the *Rural World* has stirred up some of our correspondents, and we hope waked up all our readers to the necessity of waging war against these pests. We propose to treat in this paper on some others, which we know and see to be equally noxious, and which no good farmer will allow to get a foothold on his grounds.

The Thorn-apple or Jamestown Weed (*Datura stramonium*).—Annual. Darlington says: "A native of Asia or tropical America. Both varieties—the one with a green, and the other with purple stems—are very common. The herbs and seeds are powerful narcotic poisons. Both varieties are a coarse, unsightly weed, and should be carefully extirpated by the farmer."

Barn-yards, old hog-pens and very rich ground, generally are places where this plant grows and thrives—and just such places will produce the best root crops for table use if cultivated there. It flowers in August, and the fruit is ripe in September. Children sometimes eat the seeds, become crazed and die from the effects. Sheep will eat the leaves without harm. There is a cultivated, ornamental *Datura*, which resembles the first-named plant, but has no smell and a flower nearly four times the size of the first—nearly a pure white, and very beautiful.

Cockle Bur (*Xanthium strumarium*).—Annual. "This," says Darlington, "has the appearance of a naturalized stranger, but it is considered by Gray indigenous; it is an obnoxious weed, though not much inclined to spread, and, with little attention, is easily kept in subjection. The burs are a great annoyance in the fleeces of sheep."

Now, we differ somewhat with the writer. In our opinion, it is not so easily killed. We believe the seeds will lie dormant for a year or two and then sprout. This weed also flourishes in rich and fine soil, and will there spread and develop into unsightly proportion. We sometimes see it come up late in the season, after wheat or other spring crops have been harvested; it will grow rapidly and mature the burs and seeds before the frost will stop its growing. This weed is spreading very widely, and increasing every year. If the plow is kept moving in the autumn, that will hold it very much in check; but, if found in fields recently reaped of small grain, the best and surest way is, to pull it up by the roots (not very hard work, even for young hands), before the burs set. Dry, and then burn it.

Burdock (*Lappa*).—Darlington says: "Everybody knows this coarse and homely weed wherever it has gained admittance—but everybody does not take care to keep it in due subjection. One of the earliest and surest evidences of slovenly negligence about a farm-yard is, the prevalence of huge burdock."

The plant has some medicinal properties for external application. This is also a hard thing to get rid of after it has once obtained a foothold. It is very generally spread, in the bur, over the whole farm, by all kinds of stock, whose caudle appendages are thereby converted into huge clubs; and we wish that, if the cows could be taught to handle them rather sharply around their owner's head while he is attempting to draw the lacteal fluid, this might be done—it might serve as a gentle (?) reminder, that those hideous burdocks had better be cut down.

Sheep Sorrel (*Rumex acetosella*).—The author above quoted says: "This little species (well known for its acidity) is often so abundant as to become a nuisance on a farm. Improving the land, especially by adequate dressings of lime, is believed to be the best mode of expelling this as well as many other obnoxious plants."

There was a time when we were very much afraid of this weed, and we know that at this day very many farmers are in sympathy

with us. This sorrel will take all the ground you will let it, and no useful plant or grain can, or does, grow where it abounds. But, we know from experience, that it can be kept in subjection. The best way we have ever tried was, to get the ground seeded to white clover (which is the stronger plant, and will more than holds its own against this pest) and pasture the same. Of course, manuring, frequent plowing and thorough cultivation, will keep it down, so as to be of little damage—but it will, and does, answer as a kick to boost a slovenly farmer down hill.

We expect to continue this article on weeds. We are not even a mediocre botanist, and never like to sail under false colors; for this reason we do not attempt to give a full botanical description which we might find in Gray or Wood. We give the botanical name to enable the student to look up, if he pleases, what scientists say about these weeds. One thing we desire all our readers to know, that is, if they wish to prosper on a farm and by its cultivation: No weeds should be allowed to go to seed on the place; if they do not take the weeds, the weeds will take the farm!

Morisons cynoglossum—(*Darlington*).—It is no uncommon thing to see the pants up to the middle of the slovenly farmer decorated with Beggar's Lice. They are rightly so named. Where they are found plenty, other weeds will also be likely to abound, and the farmer will soon be a beggar. Our own pants have been lined with them when going through a little copse where they had undisputed sway for years. They always gave us a very uneasy feeling, almost as if they were things of life, and we never could rest until they were all picked off. These, like other burs are carried all about the farm by the stock. Darlington says: "The slovenly farmer is apt to get a practical acquaintance with this obnoxious weed, in consequence of its racemes of bur like fruit entangling the manes of his horses and the fleeces of his sheep." There are two distinct weeds, both bur like—in fact, one is a regular little bur, and round; the other rather flat. Darling calls the one *Beggar's Lice*, the other *Beggar's Ticks*.

Smart Weed (*Polygonum incarnatum*).—Annual. This weed is very common, and occupies altogether too much ground on almost every farm. It likes the richest of soil, and will flourish and rob the farm of just that plant food which ought to be brought to the roots of wheat, corn or potatoes. Darlington says of it: "A worthless weed, as most of the species are; and it is, moreover, a highly acrid plant, sometimes causing obstinate ulcerative inflammation, when incautiously applied to the skin. The medical men of the middle ages highly extolled it for its remedial qualities, but it is not used at present." Children going barefoot will sometimes run through a thick patch of it to clean their feet (after a rain or when the dew is on); but, as above hinted, it proves a sore bath—and often the cause of the trouble is not even suspected.

The Thistle Family (*Cirsium*).—There are quite too many varieties of thistle for the good of the farmer. There is the common, Scotch, tall, cotton, cursed, Canada and yellow thistles; a very formidable array of names indeed, and a hard lot of weeds to keep under subjection, especially from this fact—that most of them, if not all, bear winged seeds, which are carried about by every wind. Not only are they an everlasting pest on the farm where they are allowed to obtain a foothold, but to all the neighborhood besides. They grow in places where it really does not seem any body's business to extirpate them; along the common highway—and especially on railroad tracks where these are not available for truck patches for our Irish fellow citizens. It cannot be long before some laws will be enacted, making it a penal offense to allow noxious weeds to go to seed, in private as well as public grounds. We have now special reference to the Canada thistle (*circium arvense*), and the Horse Nettle (*solanum carolinense*). The sooner such a law is passed the better it will be for the State.

Yellow Dock (*Rumex britanica*).—There is perhaps no other weed that seeds so profusely as yellow dock. Like all other noxious weeds, it appropriates every inch of ground you give it leave to. It sends its long and strong root deep into the soil, and it is seldom you can pull it up without breaking the root; the piece left in the soil will grow again. Where it abounds, no other good crop can flourish. To destroy it, it must be drawn or dug up by the roots entire; frequent plowing will help to keep it down. Although not so disagreeable as either bur or thistle, it is nevertheless an enemy that should not be tolerated on any farm.

Mare's Tail—(*Hippuris, Le.*).—To labor is, for the healthy man, a necessity—if he would enjoy life; if he would relish food, sleep and rest. How can a man rest unless he is tired? He that would enjoy food must be hungry. Men will labor their whole life long, so that they may rest in the evening of their days; but, what is the result? As soon as their active life stops, they droop and die. Labor, then, is a gift from God, rather than a curse. That our labors as farmers are so hard, is greatly our own fault. Look at it! We break up a number of acres of virgin soil, on a prairie if you please. The grass and a few short-lived weeds are subdued by once plowing the land; it is cross-plowed and cultivated to wheat. Not a weed on the land—is that so? Just allow your land to lay still three or four weeks after harvest, and what is the result? a splendid crop of *Mare' tail!*

SOUTHWEST MISSOURI.

REPORT OF CORRESPONDING SECRETARY.

One of the most cherished desires of our heart, namely: To see, with our own eyes, the much-lauded Southwest Missouri, has recently been fulfilled, and we propose to give a brief account of our observations.

The beautiful prairies of Northern Illinois so charmed us twenty-five years ago, that we removed to them in just one month after our eyes first beheld their beauty. To think that a country, at least *as beautiful*, formed a part of Missouri, never entered our head. What was our surprise, therefore, to find it indeed true. Some one has said that it was well our forefathers first landed on the sterile coast of New England, for had they beheld the entrancing beauty of our Western prairies, and discovered the ease with which these can be cultivated, and the fertility of the soil, New England would yet be a barren waste. But, of course, science and industry overcome most natural obstacles, as is the case in New England.

It is not at all our purpose to raise the hopes and expectations of our readers and possible immigrants to the Southwest, so high that they will feel in the least disappointed when they get there (if they ever do.) As far as we have been enabled to view the goodly land, we claim to give a truthful report.

The Prairies of this section are high and rolling, and for the most part composed of a strong soil, of a retentive clay, with more or less sand, and underlaid by limestone or gravel; and in the bottoms, a rich, alluvial soil that will produce well if rightly handled. Some portions of these prairies are rather stony and covered with a sandy-flint freestone, good for building material and fencing; but these are easily picked off and really valuable. All the old chimneys, many of which are standing while the houses or cabins for which they were built were burnt during the war, are built of these stones, and often form a very pretty mosaic from the varieties of colors shown, varying from a creamy white to a reddish brown, and the fantastic way in which these are laid.

The Inhabitants are a wide-awake, hardy, industrious class of people, coming largely from Illinois, Iowa, Michigan and many of the Eastern States. The goodly land and the immunity from long and severe winters seem to have been the principal stimulus, though many have doubtless been attracted by the cheapness and richness of the soil. We learn, with great pleasure, that there is quite a settlement of Friends, whose proverbial thrift and honesty will not fail to be impressed upon their neighbors. If we live to ever visit this section again, we shall certainly spend a considerable time with them.

Winter Wheat is the only variety grown as yet, and we saw many

fields looking quite well, though for the most part exhibiting not the very best mode of culture; not a single drill-sown field being visible on our route. We are assured, however, by dealers, that a good many drills have been sold this last season.

Corn, we should judge, would grow well, and, in our opinion, this will and ought to form the great staple of this section. Cattle will be driven here from Texas and the Cherokee Nation to be fattened; and when the Southwest Pacific railroad shall be completed to Springfield and beyond, they will will seek St. Louis as a market, or as an entrepot to the East, if St. Louis can offer as great inducements in the way of stockyards, etc., as Chicago.

The Grasses will do well. This has been proven by one farmer, at least, who has a four hundred acre blue grass pasture, on which he winters his stock, the wild grass furnishing the best kind of feed in abundance for the summer range, while his blue grass is not touched. We noticed one field of red clover looking well, sown this last spring. Hay is cut from the prairies in great abundance; and such is the fertility of the soil that over five tons to the acre have been secured this season; and men can now be found who will lay a wager that they can find, on the prairies, an acre that will yield five tons, now that it is dry and frost-bitten. Of course, with so much of this material. *prairie fires* are most extensive and often do a great deal of damage. One night, while we were riding from Springfield to Carthage, the fire burnt over a very large prairie and through the woods. There was no need of lanterns to the coach; it was almost as light as day, and the scene was grand in the extreme. Could we have conjured up a dozen or more of horsemen, to canter back and forward against the horizon and between the fire and our eyes, we might have fancied that the "red man" was on his war path, leaving death and destruction to mark his track.

Timber is, in good proportion, and in Jasper and adjoining counties, especially, one is constantly in sight of the woods, more or less distant, often within sight on three sides at once.

There are pineries in Arkansas, distant from Jasper county about seventy miles, of course less so from Newton and McDonald counties, which lie south of Jasper. These furnish building lumber and fencing, though saw mills are established on most streams, and furnish a very good article of oak lumber, which is sold at reasonable rates. For fencing, Osage orange is in common use; and when we shall have a law which will declare a well-set live hedge, one year old, a lawful fence, Southwest Missouri will have plenty of timber for all time to come, especially if the settlers now will exercise economy, wisdom and forethought, and plant timber belts on all their prairie farms.

Water and Streams are plenty, and these latter are fed by living springs; the quality of the water is excellent. Spring river is large enough to drive machinery. Of course, we could not ascertain its

fall and where damming would be feasible, but it must be strong enough at some points, for the water flows quite swift.

One valuable feature about the streams that we traversed, and which we had a good chance to observe is this: they all have a hard gravelly bottom, and offer secure fords.

Good Dwellings may be found on many farms; but we have often thought there was as much love, affection, comfort and enjoyment, in the rude cabin as in the palace, and that is our opinion still. We now call to mind two or three years of our own experience in log cabin life, and are foolish enough to mention it with a sort of pride.

But, we are straying, we did not intend to mention names, but make an exception in the case of a Mr. Pierce, formerly from Stephenson county, Ill., and who now lives near Montevallo, Vernon county. This gentleman and thorough farmer has just finished a large and commodious bank-barn, after the style of Pennsylvania farmers. Knowing the comfort this will insure to him and his stock, even in this most mild and genial climate, and the opportunity he will thereby secure to save manure, we cannot but commend it. The basement, or rather lower story—for there is no portion of it beneath the level of the surface soil—was substantially built of the same free stone before mentioned, and looked really beautiful, while the barn itself is a good frame and was just being painted. In a few years there will be many such in that vicinity, or we overrate the force of example.

Orchards and Nurseries.—One can hardly imagine a country better adapted to fruit growing than the one under consideration. Peaches, apples, pears, plums, cherries and the so-called small fruits, all do well here, and will until the insect foes shall become too numerous for the orchardist. This, we hope, may never be the case, and if these good people will but heed the teachings of our State Entomologist, they can at least put off the evil day, or be properly equipped for the battle and come off victors.

Large nurseries are being established in many localities, by most reliable men, as we have reason to know; and in a very few years, fine, large orchards, of the choicest cultivated fruits, will be found on every farm. In our report of the fair, we mentioned the fact that Mr. Lamb exhibited eleven correctly-named varieties of winter apples; and we doubt not others might have done as well had they taken the pains to gather, select and bring them to the show.

Drouth is said to be a great drawback to this part of the State. We do not believe that it is any more subject to annual or periodical drouths than the vicinity of St. Louis, or Lexington, or any other portion of land west of the Mississippi. No one need be afraid of this bugbear. Good cultivation will, in a great measure, overcome even drouth.

Minerals abound in this section. There are rich lead mines at Granby and at Minersville, and these can hardly be called fairly

opened yet, indeed, the extent of surface explored is as yet very small, and the mines are very shallow, and yet, the results attained are very satisfactory. Much more could be done with an increase of steady miners, and these in turn would furnish a home market for the agricultural products. By invitation from Colonel Young, who is in charge of the mines in Minersville, and who also represents Jasper in our Legislature, we visited the mines under his supervision, and were much interested and thoroughly impressed with their riches. Coal is also found in various parts, and at no distant day will be much used for family fuel and manufacturing purposes—it is to some extent already. Brick clay is not very plenty, but is found in some places. Limestone abounds.

We feel our inability to do justice to that highly favored portion of our State in a short article like the present, but we have reached the limit of our space, and must desist for the present, only adding one word in favor of Jasper county, and that is in these words: She has saved all her records *unimpaired* through the war.

Some idea of the amount of business done at one of the embryo cities (Carthage) may be inferred from the fact that there are two banks, each of whose deposits and disbursements amounted to over *one million* of dollars for the year.

Sorghum is a good crop in Southwest Missouri. The cane yields well and the quality is No. 1.

SOUTHWEST MISSOURI STOCK AND AGRICULTURAL ASSOCIATION—FAIR AT CARTHAGE, JASPER COUNTY.

The Fair Grounds, situated about two miles south of Carthage, and comprising eighty acres of beautiful prairie, without trees, however, except a few which had been planted by the former owner for homestead purposes. We learned that the Association were offered, as a gift, a warranty deed for twenty-two acres of land well adapted for a fair ground nearer to the village, but that the majority of the directors thought that plat too small. Never was there a greater mistake! If that step can be retraced; if that offer is still held out —by all means, gentlemen, bestir yourselves, and gratefully accept it. Would that our advice were timely and that our counsel could yet be adopted; we should count all our fatigue, time and labor as nothing, compared with the good we were able to accomplish in the cause for which we labor in this direction. The possession of a mile track does not weigh a feather against other advantages which would accrue. It is well enough to be able suitably to try the style and speed of horses, but unless racing, with all its demoralizing influences, is intended to be the main and dominant feature and object of this Association and its fairs (and if it is, or is to be, we are much mistaken), twenty-two acres are ample, very ample, and will afford at least a half-mile track. Then, the means now invested in the land

only, could be devoted to the usual improvements on fair grounds; embellishments; proper buildings for exhibition and offices; raised seats, &c., &c. Again, gentlemen directors, we entreat you to retrace your steps, if it be yet possible.

The Fair, as a first effort, was a decided success; the attendance large for so scattered a population; the exhibition far beyond any thing we thought it possible to make at a first fair. We did, however, look for more and better horses, especially thorough-breds; these, in a country where so many ride horseback, are generally abundant; perhaps, however, the war used up a good many, and the new importations from Kentucky, or elsewhere, are few.

The Short Horns were well represented by Josiah Tilden, formerly from Galesburg, Illinois, who bought over 1,500 acres of land in this county last fall for a stock farm. He has some fine stock on exhibition, which attracted general attention.

His Short-horns exhibited were, the *Duke of Jasper*, red and white bull calf, seven months old, by 10th Duke of Thorndale (5610); dam, Arzie, by Royal Oxford (18774; dam, Agnes, by Lord Brawith (10415); dam, Alva, by Amateur (3007); dam, April Daisy, by Belshazzar (1703); dam, by Abraham (2905); dam, by Simon (5134); dam, by Young George (3885); dam, by George (276).

Belle of the Valley, red, by the 11th Duke of Thorndale (5611); dam, Lady d'Argentine, by Duke d'Argentine (4703); dam, Maid Marion 5th, by Albion 19209; dam, Maid Marion 2d, by Lord John (11728); dam, Maid Marion, by Robin Hood (9555); Lily, by Young Zealot (8797); dam, Lily, by Young Vandyke (8733); Duchess, by Young Spectator (8519); dam, by Phantasia (8389); dam, by Young Rockingham (8489).

Both bred by James O. Sheldon, Geneva, N. Y., and purchased of him by Mr. Tilden last August.

Lassie, red and white, two years old, by Hickory (4022); dam, Julia Dunlap, by Diamond (2713); Julia, by Bob (1262); Juno, by Commodore (3448); Eudosia, by Frederick (515; Beatrice, by Contention (3479); dam, by Ferguson (1548); dam by Embassador (3711); by Pluto (825).

Red Rose, red, two years old, by Hickory (4022); dam, Laura Olson, by Diamond (2713); Laura, by Bob (1262); Queen of the West, by Suwaroff (2275); Eudosia, by Frederick (515); Beatrice, by Contention (3479); dam, by Ferguson (1548) dam, by Embassador (3711); dam, by Pluto (825).

Mr. Tilden also showed a thorough-bred Alderney or Jersey bull calf, obtained of Mr. Sheldon.

Mr. Lukens, also formerly an Illinoisan, exhibited a fine four-year old thorough-bred bull, raised by one of the Alexanders, in Kentucky, and bought by Mr. L. at the State fair of Illinois, held at Quincy. These animals are a great acquisition to a country which

will ere long be at the very head of the State in fine stock. Some fine grade cattle were exhibited by other parties.

Swine.—Mr. Tilden also introduced some superior swine of the Poland and China breeds. Stock obtained from such breeders as A. C. Moore, of Canton, Ill., and H. M. and W. P. Sisson, of Galesburg, Ill., whose stock attracted so much attention and sold at such high prices at the recent fair in St. Louis. This stock drew a crowd of farmers, and quite a number of orders were given for pigs to be delivered in the spring. Chester Whites and Berkshires, both very creditable, filled quite a number of pens.

Sheep.—Some of the finest Spanish sheep we ever saw of the Hammond-Vermont stock, with a few from other breeders, were exhibited by M. G. Skinner, Captain A. Foster and others. These gentlemen were enterprising enough to build proper pens, and had the sexes and ages well divided. They had pedigrees and photographs, and the whole sheep show was in every respect No. 1. Farmers and breeders of this class are an acquisition to any county, and we congratulate Jasper county upon her good fortune, and long may they flourish.

Poultry.—If any one had said to us before entering the grounds, "You will see some of the finest poultry you ever saw anywhere," we should have esteemed it a good joke. Judge of our surprise to find a splendid trio of Creve Coeurs, more than a dozen light-colored Brahmas, White Cochins, White Bantams, very fine Black Spanish, some Chittagongs, Cayuga ducks, &c.; a really fine show. Mr. Tilden was the principal exhibitor.

Not the least feature of the fair was, that part which embraced the display of fancy needle work and embroidery, domestic counterpanes and quilts, which was ahead in every way of many a county fair in a country not nearly so new, showing evidently that the ladies of Jasper are accomplished women and good housekeepers. This (good housekeeping) we know includes many other branches, among these the dairy; there were at least three good samples of butter, well made, of good color, and not too salt; these we tasted, yes, and eat—and we know good butter if we know anything. Jellies, canned fruits and preserves, were shown, not in
it is true, but of superior quality. Commend
thage and vicinity—they have good lo
informed, good company, and the best
wish to call names, but let us give you a
did and will do: "A young man pledg
separate, he to make his fortune in the
mountains. Years intervene: he is si
tries and tries again; ten years go by;
again pass: yet they are true. He r
waiting; he comes to Jasper county, M
commences to make a home. Needi

pinery with two teams; he drives the mules and she (his wife, just married) the horses; thus she helps and is happy. Yet this lady is quite accomplished, is well acquainted with books, understands music so well that she can take a solo part in a public concert, use a sewing machine, &c., &c. Another, being a strong and robust woman, assists in making fence, striking blows about with her husband, in driving the posts. These are examples, and can be duplicated *ad libitum* in the essentials. But, we have stepped aside.

The Fine Arts were represented by some finely executed photographs and ambrotypes, and some of Prang's best chromos.

Fruits.—I. N. Lamb, the President of the Association, exhibited eleven of the leading sorts of fall and winter apples, fine for size and flavor, highly colored, and without the marks of a single insect that we could discover. It is possible Jasper county may send us a collection of her fruits for the winter meeting of our State Horticultural Society, and a delegate—but we shall not anticipate.

The Annual Address was delivered by the writer. The audience was attentive and quiet, and perhaps a few grains of good seed have been sown; if so, we are repaid.

Ladies' Equestrienism must, of course, also be attended to. Four fair competitors (again we declare that we are not using a figure of speech) entered the list, and acquitted themselves admirably. The awards had our most cordial approval. All should have had a prize.

Other Features.—The weather of the first two days of the fair was raw and chilly, but the last was a beautiful and cloudless one, having the true haze of an Indian summer. The attendance was a great deal larger than we expected to see. The fair grounds are new and very incomplete in appointments. No doubt a greater and a more successful effort will be made another year, if we can read the directors at all. Of the races nothing need be said either way; the time made in the trot was decidedly slow, say 3¼ minutes. Carthage has a brass band, very good for beginners; they perform gratuitously on public occasions, and are a pet institution of all the town, *and deservedly so.*

COUNTY REPORTS.

COUNTY REPORTS.

CAPE GIRARDEAU.—HON. M. J. HINES.

The geographical position of Cape Girardeau is in the southeast portion of the State. Its whole eastern border is washed by the Mississippi river, in latitude 37° north, commencing 120 miles south of St. Louis. It contains an area of upwards of 350,000 acres, not one-sixth of which is cultivated. The climate is mild and healthful, not subject to long winters, or extreme cold. It contains a population of about 20,000. Cape Girardeau is the chief town, with a population of about 6,000. Jackson is the county seat, and is situated near the center of the county, with a population 800 or a 1,000. Appleton, Pocahontas, Oak Ridge are villages in the county.

CULTIVATION OF THE SOIL, &C.

We have men, educated doctors, who propose to heal all the ills belonging to the human body. We have doctors of law; also, those who propose to minister to the immortal soul. We are also wanting doctors, educated, to relieve our sick, debilitated, and partly ruined old fields. The quacks heretofore practicing, have been of the rampant kind, they have depleted as long as the soil could "sprout a pea," and then they turn them out, call them old, worn out, and worthless. Those quacks, have no use for tonics, however they sometimes apply small blister plasters,—and then pronounce the patient incurable. They now move over and take possession of another virgin spot, which like the former virgin, is violated, and deserted. We have a common interest in a common mother, though she be earth, we scorn to see her outraged, and her reputation questioned. She contains all that can promote our successes in life. The prosperity of the world depends upon the cultivation of the soil, and every effort should be put forward to elevate and foster agriculture. Take from the hands of ignorant quacks the care and culture of the fields. The greatest gift of God to man: there is nothing so valuable as the soil, that man can call his own. Let the practical farmer give new impulse, infuse new life into the system of agriculture. *We* are cultivating our farms as did our fathers and grand-fathers, while progress is stamped upon almost every department of human industry. I speak with due regard for the fathers, yet I claim that we are re-

quired to improve upon their system of farming. The quacks say that lands are cheap, and the only way to make it pay, is to secure first the cream, and they make it fly,—corn, corn, wheat, wheat, away goes the cream, and a little bonny-clabber, or blue whey, is the legacy left to their children, or those who succeed them. Go into almost any county in the rich southwest, where the lands are undulating, and we see the enemy drawn up in line of battle, (red "clay".) I speak thus, with due regard for truth, and for those who butcher the soil. It is not a crime attributable to the southeast alone, you will find the butcher at work in almost every part of the State, where the lands are undulating. We farmers of Southeast Missouri, must adopt a different system of culture, or we will soon have no virgin spots left, but instead a barren waste. Man requires a change of diet, as do all domestic animals; the lands, however rich, require a change of crops—rotation, &c. Clover is the great invigorator, turn it under,

"Plow deep while sluggards sleep!
And we'll have grain to spare, and to keep."

Not only do we see the rich soil disappearing like snow before the noon-day sun, but we see the finest forests in the State, falling by the ruthless hand of waste. Like the soil, it is too cheap to save. The wanton waste may be compared to that of the wild deer; not twenty years ago, the hunter prowled the forests and shot down these innocent animals merely for their pelts, and now it is a rare chance that we even see one of these beautiful creatures. The mountain deer, like the poor red man, has almost disappeared, fallen before what is termed, the march of civilization. Though created by Deity, and in his express image, they are hunted upon their own soil, and shot down like the wild beasts, simply because he has stamped upon his nature, by his Creator, a spirit of self-defense. The same cause induces the the little worm, when pricked, to roll himself up and make the best defence he can. I am fearful we are contracting a great national debt—foreign to greenbacks, more terrible than the national sport of hunting down those poor creatures, called "Indians." South America too, once boastful, dealt out to the red children of the forest, fraud—destruction. How stands their case to-day—objects over which angels weep? God is just. I set out to speak of poor old fields, and wasted forests, not of

"Gilded loam,
Or painted clay."

Twenty years hence, and we will have without a change, in our conduct but a wreck of what is now a magnificent forest.

On the old farm upon which I reside, I can show enough wasted timber to have supported the farm for years. Not only it is the case on my own, but on almost every farm in the county. We should bear in mind that it is never too late to cease to do evil, or too soon to do good. I will urge every farmer to save his timber, and his rich lands, cultivate to save and improve, think not that land is cheap. Suppose

those old worn out lands which have yielded an abundance and to spare, from the cream of which we have reared our children, could be reclaimed and made to yield as of old, and quadrupled in value, would we not rejoice? We *can* reclaim all, and they *will* be quadrupled in value.

I read not long since, in an agricultural report issued from the Patent Office, a statement that billions of treasure lay dormant six inches below the present reach of our plow-share. Scientific Agriculture will make the desert a garden, and our old fields can be made to blossom as the rose. The facts need no comment at this late day. We might however, refer to the thousands of acres in the Old World, that have been cultivated a thousand years, and now yield larger crops than at first. Sandy wastes, and stony hills, are yielding annually and abundantly, rich harvests, golden tribute to science.

Increase the team, and let in the plowshare—it will win. Do not think we can succeed so readily after the cream is gone, and blue-john—red clay—appears.

Old Cape Girardeau is the mother of counties; is an old new county, or soon will be, after all is said. Not one acre of her exhausted lands but can be reclaimed, and in a few years quadrupled in value. Tonics and strengthening plasters will do it—anoint with "elbow-grease," "hers to command." We'll have it, labor has commenced, the improvement is apparent. There is but a fraction of the county, perhaps not an acre, where the steam whistle on the Father of Waters, or the snort of the iron horse on the Iron Mountain Railroad, cannot be heard. Soon, we trust to see the flight of the iron-wheeled steed, and hear his snort on the State Line road, which is surveyed from Cape Girardeau to the Arkansas line, and we trust ere long work will have commenced. At Little Rock, we connect with the Great Southern road, which is built from Norfolk, Virginia, to Little Rock, Arkansas; then for the golden sands of the Pacific, *via* El Paso and San Diego, not to grapple with ice and snows, but warmed by a genial sun.

All in all, Cape Girardeau is a county to be proud of, if cared for. I am aware of the great partially of writers, almost every one has his favorite section. I claim for this old new county, facilities which cannot be surpassed. Her surface is mostly undulating, rich soil, supporting fine forests of valuable timber, for building purposes; we have fine beds of stone throughout the county, and clay adapted to brick of the best quality. The city of Cape Girardeau stands on a bed of marble, from which the State House of Mississippi was built. It is used extensively for tombs and monuments. We have in other parts of the county the same stone, with beds of variegated shades, red, black, and gray. The best lime is made in all parts of the county, often only burned on log heaps.

WATER.

No section of the State equals the Southeast for good and clear water. We have many valuable streams, affording the finest water privileges, with brooks innumerable, running the entire year, clear as a crystal. Almost every farmer has a spring of water, clear and cold, which for dairy purposes cannot be excelled. The water generally is impregnated with lime. On our eastern border, along the margin of the great river, are springs of soft water, pure as virgin snow. Here is what we call the River hills, a belt extending the entire length of the county, and from four to six miles back. These hills afford rich soil, and fine timber. For fruit growing they cannot be excelled, being on a parallel with the fine fruit lands of Southern Illinois, remarkably healthful. The writer of this article, has resided for thirty years on the banks of this great river; He has reared a large family, which can boast of good health, never having lost a member of his family. During the thirty years he has had every year, peaches, with three exceptions, and the wild grape as regular as the seasons. The soil being remarkably light and rich, underlaid generally with slate, and a kind of rotten flint, which afford ample drainage. We trust ere long our river hills will be studded with vineyards, and the song of the vine-dresser will be heard on every hill, together with the bleat of the lamb, and low of the cow. For sheep husbandry these hills are unsurpassed, and not only for sheep, but for stock generally. The grasses succeed admirably. I have heard from my youth that the blue grass country of Kentucky, was the most favored sections of America, for growing fine stock. Just before the commencement of the late war, it was my pleasure to visit that favored section of our common country.

Taking Lafayette as a basis of a rich county, I propose to place Cape Girardeau beside her—there is no need to blush for the latter. She will compare favorably.

First, I will not say the blue grass will grow quite so fine as it does in Lafayette, however, it is here as there, the natural product of the soil. Clover, timothy, red-top and orchard grass, succeed here equally well, if not better. Outside of mechanical or chemical investigation of the soil, the forests, stones, &c., are the very best criterions by which to judge of soils. The timber and stones of the aforesaid counties, are much the same, to wit:

The varieties of oak known to the West, black and white walnut, ash, hackberry, elm, black and white sugar maple, hickory, yellow poplar, honey locust. Of undergrowth, we have red bud, dogwood, pawpaw, hazel, spice bush and sumach, &c., The only marked difference is, the large growth in Lafayette appears more scrubby, does not grow so tall as in Cape Girardeau. Stone apparently the same, limestone predominating. The face of the county much the same, undulating.

Kentucky river hills, equally ragged as our river hills, however, not so well adapted to fruits, more especially for the grape, which succeeds far better on the banks of large streams, than on smaller ones. Their lands are valued from $75,00 to $200,00 per acre, ours from $5,00 to $30,00.

We will now analyze, and mark the difference: Lafayette lands are all cleared, fenced, the undergrowth removed, and sown to grass, when not cultivated. Lafayette grows stock, and cultivates its lands systematically. The farming operations of Cape Girardeau are different, corn, corn, corn, wheat, wheat, wheat. Our wood lands are in the brush. Our system of cultivation impoverishes the soil, while theirs improves it. Dress old Cape Girardeau in the garb of Lafayette, and she will not be wanting in grandeur.

The whole I am sorry to say is within a nut-shell. Their people are more energetic; we have been slothful. I trust my neighbors will not be angry at this remark, I place myself in their midst. We have not had the energy we ought and hope to have. Sloth seems to be produced by a miasma; once inhaled, the malady rages a kind of epedemic, contagious in the extreme, and always attributed by a class of literary gentlemen, to what they please to call "slavery." Slavery is not the cause of a want of energy. I speak of negro slavery as it once existed in this county. I know not what effect may be wrought by a change from "black to white slavery." This sloth seems to be prevalent in all new countries, where land is rich and cheap. Once engrafted, it is like the seven year itch, hard to remove. When we do emerge from it, there is a "new skin" upon the animal. The writer of this article does not hail from a boasted section of the country; he is a Missourian by birth, educated in a little log school house in the wilderness, amid the howl of the wolf, and the screams of the night bird; however he claims for himself not to be destitute of truth.

IMPROVEMENTS AND MACHINERY.

Cape Girardeau has many fine mills, propelled both by steam and water. There are eleven flouring mills in the county, manufacturing as good an article of flour as any country produces. We also have in operation three woolen factories, which spin and weave, two of which run 240 spindles each; the third I am not able to give the number of its spindles; all of which have been established within two years.

SCHOOLS.

Every neighborhood in the county has a free school open from four to six months in the year. Our school-houses are not all as good as might be desired. At Cape Girardeau, Jackson and Pleasant Hill we have high schools. St. Vincent College is situated at Cape Girardeau.

CHURCHES

Are good and well attended.

CROPS.

Agriculture here is in its infancy. However, the crippled child has commenced to walk. Our farmers are beginning to realize the fact of depletion, and are beginning to build up.

Wheat is our greatest staple, and succeeds well; the quality unsurpassed; the proof: it demands the highest figures in the market. Winter wheat is grown altogether. No such a thing as a failure from freezing out. The yield per acre is from 15 to 20 bushels; corn, oats and barley are good and sure crops; corn, from 30 to 75 bushels per acre; oats, 20 to 25; barley, winter, 30 to 50. Vegetables of all kinds that grow in this climate succeed well.

MEADOWS.

The grasses succeed well, are however greatly neglected.

TOBACCO.

As good an article can be grown here as in the most favored sections of the Old Dominion. Hemp and flax are but little cultivated.

FRUITS.

This is the land of fruit. Apples, pears, peaches, plums, cherries, quinces, etc., etc., all do well. The grape is becoming an object, and I am glad to say that vineyards are being planted in all parts of the county, however, at present only on a small scale, varying from one to five or six acres.

WILD FRUITS.

The plum, blackberry, raspberry, persimmon, grape, mulberry, paw-paw, cherry, etc., are abundant.

STOCK RAISING

Is greatly neglected, especially the fine breeds. We are in want of fine stock, horses, cattle, sheep and hogs. It should be introduced. This would be a superior section for growing stock; mild winters and fine clover lands. We have traders buying up stock, always ready to take the surplus at remunerative prices.

REFLECTIONS.

1869 is reeling, and will ere long be numbered with the past. Its record is peace and plenty. The crops of 1869 are abundant; its winter mild; seasons good and healthful; its 365 days have been golden jewels, studs set in the crown of time, for which we thank the author of all good—our Heavenly Father.

COLE COUNTY AGRICULTURAL AND MECHANICAL ASSOCIATION.

JEFFERSON CITY, February 1, 1870.

MR. CHAS. W. MURTFELDT,

Corresponding Secretary State Board Agriculture:

At your request I herewith submit the result, with some general observations, of our last county fair:

We offered premiums to the amount of $2,000, about half of which was given as premiums on stock, and the balance divided between machinery, grain, fruits, etc. Although the weather was very fine during the fair, we were pecuniarily loosers to the amount of $170 74. We attribute our loss to the general apathy of the farmers in our county, (with many honorable exceptions). Many farmers do not seem to be able to reconcile to themselves the fact, that there are other interests in the county than the *horse* interest; and while they seemed to be carried away with horse excitement, they appeared to be totally callous in regard to the equally important interest of fruit, grain and machinery.

The directors when aware of the deficit, immediately ordered an assessment to pay all arrearages. The society is now out of debt. They own 40 acres of land, all paid for. The buildings are first-class. The amphitheatre is capable of accommodating 6,000 persons, it is 385 feet in diameter, with booths under the seats for refreshments. We also have a neat cottage for the accommodation of the ladies. The show-room for textile fabrics is 25 feet by 60 feet. There is 75 stalls for horses and cattle, besides pens for hogs and sheep.

We had a splendid display of fruits, one gentleman having 40 varieties on exhibition. Our county being a fruit county, and, having in our midst some practical and energetic fruit culturists; we feel satisfied that within a few years our county will be second to none in the State, in the fruit interest.

Our society have frequently desired to offer agricultural papers as premiums, but, have so far, from different reasons, neglected to do so. I can hardly hope for any great success in a county agricultural society, until the farmers are educated to the importance and benefits of county fairs, and, the quickest and easiest way to do that is for each farmer to be a regular and diligent reader of one or more agricultural papers.

I would recommend the old law to be re-enacted, authorizing county courts to subscribe a limited amount to be expended for county premiums. Such a law would enable new and weak societies to make a start, and those that have a beginning a more creditable showing.

The popular opinion is, that these county fairs are generally money making machines to those that run them; but, from my long observation and connection with them, I am positive in the belief,

that, the public generally, are as much benefited as those who run them.

The following gentlemen compose our present officers: G. B. Berry, President; Levi Dixon, Vice President; C. Wagner, T. L. Price, Jno. G. Schott, J. T. Rogers, A. Gundelfinger, W. C. Rickey, and Gilson Ewing, Directors; J. Christy Watson, Secretary; C. F. Lohman, Treasurer, and W. H. Conn, Marshal.

The regular annual election of officers takes place on the first Monday in May, of each year.

Respectfully,

J. CHRISTY WATSON,

Secretary Cole Co. A. & M. A.

HENRY AND ADJOINING COUNTIES—H. P. SLOAN.

Chas. W. Murtfeldt:

DEAR SIR: Yours, asking for something to add to your annual report, in regard to location, immigration, natural advantages, etc., in this portion of Missouri, has been received.

Our immediate locality is so remote from the several county seats that there has been but little interest in fairs or public enterprises, on account of the distance. This very fact has prompted our people to make an effort to have a new county organized, which, if accomplished, will afford us a convenient opportunity to join with other portions of the State for the development of our great State in agriculture and manufacturing.

Johnson and Henry county each have held fairs the past year, with a promise of increasing interest. The immigration coming in from Illinois, Ohio, Kentucky and other States, are bringing in some good stock.

Dr. Barbour and Brother, from Illinois, have bought a large farm in Henry county, and have stocked the same with some of the best stock from that State, including cattle, horses, and hogs.

I submit the following (or as much as you choose to use) as information in regard to this locality:

AGRICULTURE.

To the farmer and agriculturist this region offers many inducements. Improved farms and wild lands are offered at comparatively low prices, ranging from $20 to $35 for improved, and from $8 to $15 per acre for wild land. The soil is productive in the grains and grasses. Stock-raising is a most profitable branch of husbandry. The mild and short winters render the expense of feed and protection much less than in a higher latitude. The country and climate are

conducive to the health of all classes of stock, horses, cattle, hogs and sheep, as has been proven by an experience of thirty or forty years.

FRUIT-GROWING.

To those desirous of fruit-growing, there is no locality more inviting than this. We are just within the "Peach Line," as it is called by some. North of the Pacific railroad, the peach crop is more liable to fail. Here we may expect three crops out of five years, at least. Apples seldom fail, and are of very fine quality, both trees and fruit but little subject to disease.

Pears, plums, cherries and apricots thrive well, and produce abundant crops. The grape is at home in our soil, producing the finest clusters of most delicious fruit, with seldom any disease or blight.

Small fruits of all kinds do well. Very soon our communication with the northwest States and Territories will open to us a market much more accessible than from Southern Illinois.

There is, as yet, very little attention given to orcharding, and the best of lands for that purpose can be obtained at low prices.

WATER.

A stranger coming into this country from a region where many cold, strong, running springs and brooks prevail, would be disposed to call this a poorly watered country. We have not many strong springs, and not many lasting running streams, yet there is plenty of good water for man and beast.

The streams and creeks, although not always running, have more or less of deep pools, that hold water the year round for stock. In many localities are springs which never go dry, but afford a supply of stock water. Good wells of water can be obtained by digging from twenty to forty feet, very generally, and of excellent quality. In no country can artificial ponds and cisterns be made more easily, whereby an abundance of water for stock and other purposes can be provided.

HEALTH.

To find a country free from prevailing disease and sickness is most desirable, but to find one entirely exempt from sickness, more or less, during certain seasons, that produce malaria, would be presumption, on this earth. Yet this portion of Missouri may be truthfully classed among the most healthy of countries. The past summer and autumn has been an unusually sickly season throughout the west, yet there has been a very small per cent. of fatality here.

SOCIETY.

Much inquiry is made by those seeking homes in Missouri as to the state of society, schools, churches, etc. Society here is much in advance of what is expected, or even represented by many when speaking of Missouri.

The old settlers remaining are generally a hospitable, kind and generous spirited people, and welcome all good, law-abiding citizens into their midst.

In no community elsewhere, of the same population, can a better state of morals be found. Schools are organized, and good school-houses of modern style and improvements are built and being erected in every neighborhood. Church organizations of various denominations are established. Harmony and good feeling prevail in the community, regardless of sect or party. The bitter feeling which existed here during the war has greatly abated, and will very soon give place to universal peace and brotherhood. As an evidence of the improvement of feeling, we insert an incident which occurred in our town a few weeks ago, at a public mass meeting, held to advocate the claims of the new county. It was mutually agreed upon by two of the leading men of the Committee of Arrangements, one of whom had been an officer in the Confederate army, and the other had been an officer in the Federal army, that the Union flag should be raised. So at the appointed time it was hoisted by a Federal and Confederate soldier, each taking hold of the *old* flag, and spreading it to the breeze.

The citizens, both old and new, take hold of improvements and enterprises, and work shoulder to shoulder with a commendable spirit, and it will not be long until our society will be equal, if not in advance of that which the immigrant leaves behind.

CLIMATE.

The latitude of this county is about 38½; mild, salubrious and healthy; winters moderate and short; summers agreeable and pleasant. The highest temperature of summer seldom goes above ninety degrees, and the lowest of winter, rarely falls below zero.

COAL.

Nowhere in the State can there be found better and more abundant coal beds. The quality is superior for smithing and forging, as well as for fuel. Along the head branches of the Tebo are several mines already worked by Messrs. Johnson, Williamson, Ogan, Chappell, McKinley, and others. Messrs. Hurd and Condee, of Sedalia, have leased several tracts of land in the vicinity of Windsor, near the line of the Tebo & Neosho Railroad, with a view to operating largely as soon as the railroad is completed. Coal is sold at the bank now from ten to twelve cents per bushel, but when more extensive and expeditious facilities in mining are used, it can be afforded at a less figure.

RAILROADS.

The Tebo and Neosho Railroad, which was formerly located from Sedalia, a point on the Pacific Railroad, to Fort Scott, in Southeast Kansas, and now located from Sedalia to Boonville, on the Missouri river, passes through the center of the proposed new county, touch-

ing Clinton, and other points southwest. The grading from Sedalia to Clinton is now about completed, and the ties being delivered with a view of beginning laying the iron early in the spring of the present year. A large force of hands are at work on the line from Sedalia to Boonville, which will insure the early completion of that part of the road which give us direct communication with the Missouri river. It is the purpose of the managers of this road to extend it as rapidly as possible to the Mississippi river at Quincy, securing to the Southwest and Central Missouri the advantage of connecting with various routes to Chicago, Iowa, Minnesota, and all the important points on the Upper Mississippi. When this road is extended to the southwest border of Texas and the Indian Territory it will be one of the most important thoroughfares of the country. The country through which this road will pass from its connection with the Mississippi river to its terminus southwest will be, without question, one of the most productive in the way of grain, stock, coal, and minerals of any portion of our great Republic. These resources, together with our centra position on the great highway from ocean to ocean must, without doubt, place this portion of Missouri in a favorable position for growth and prosperity. The Pacific Railroad passes about eight miles north of the northern boundary of the new county.

IMMIGRATION.

During the three autumn months just passed there have been passing over the Clinton road, through Windsor, from fifty to seventy-six immigrant wagons per day to settle in Henry, Bates, Vernon, and other adjoining counties of Missouri; also many that are bound for Southeast Kansas and the Indian Territory.

HOLT COUNTY AGRICULTURAL AND MECHANICAL SOCIETY FOR THE YEAR 1869.

At the close of the second annual fair of this society, the membership numbered one hundred and eighteen of the most substantial citizens of the county, representing almost every class of industry, who promptly came forward and gave of their means to aid in the permanent establishment of the society. With the means thus obtained, ten acres of elevated ground adjoining the southwestern portion of the city of Oregon were purchased by the society in the beginning of the year 1868, which is now worth, exclusive of improvements thereon, $2,000. The improvements consist of a fine fence, seven feet in height, constructed at a cost of $1,000; a floral hall, built at a cost of $1,600; a good well, costing $100; seats, stalls, and other improvements, $300, making the total value of grounds and improve-

ments $5,000. Against this there is a total indebtedness of $1,500. To meet this there is still an outstanding stock subscription, payable January 1, 1870, amounting to $500, still leaving a balance of indebtedness amounting to $1,000.

The principal improvements necessary for properly conducting the annual fairs having been made, no difficulty is apprehended of the ability of the society to meet its obligations promptly.

At the second annual fair of the society, held at their grounds September 15th, 16th, 17th, and 18th, 1869, one hundred and fifty-four premiums were awarded, amounting in the aggregate to $1,000.

The live stock on exhibition included many fine specimens of horses, mules, jacks, jennets, cows, bulls, sheep, hogs, etc., and numbered one hundred and thirty.

The industrial department contained one hundred specimens, representing many of the most useful and ornamental articles of home productions.

Forty-six agricultural and horticultural entries were made, embracing wheat, corn, potatoes, apples, pears, peaches, plums, etc., of the best quality.

The floral department and the fine arts were well represented, but might have been more complete. An effort will be made at the next annual fair to give greater encouragement to these departments.

The present year, despite the ravages of the grasshoppers in the spring and early part of the summer, and the extraordinary fall of rain, has been one of unusual prosperity to our county. Many new citizens have been added to our population, towns have sprung up as if by magic, thousands of acres of lands have been fenced and brought into cultivation, the staple products of the county have increased in many instances to more than one hundred fold, fully one million bushels of good corn have been produced, the average price of which will not be less than forty cents per bushel; the products of wheat, rye, oats, and barley, although injured to some extent by grasshoppers, will not fall short of two million bushels. The number of bushels of apples for the year is estimated to exceed fifty thousand bushels. Fifteen years ago the product was less than twenty-five hundred bushels, very little more than is now produced by the town of Oregon alone. The number of bushels of pears will exceed two thousand, the average price of which will be at least $3 50 per bushel. Of other fruits, including grapes, cherries, plums. etc., our farmers and gardeners have produced large quantities of the best quality. The clip of wool is estimated to reach thirty thousand pounds annually, a considerable portion of which is manufactured in this county. At the close of the season not less than thirty thousand head of hogs will have been marketed, netting an average per head of at least sixteen dollars, making an aggregate of $480,000. Add to this the cattle, sheep, mules, and other stock sold during the year,

and we have a total of sales of live stock for the year 1869 largely exceeding a half million dollars. To this may be added the surplus fruit, grain, firewood, sawlogs, etc., and we find that our sales for the year are more than a million dollars.

G. R. CUMMINS, *Secretary.*

JASPER COUNTY.

CHAS. W. MURTFELDT,

Corresponding Secretary State Board of Agriculture:

DEAR SIR—Yours of December 28th came to hand two days since. Will briefly report our Association.

The articles of incorporation were signed January 13th, 1869. The main objects of the Society, as set forth in those articles, were, "to encourage and promote the agricultural, mineral and manufacturing resources of the county, and to advance the buying, selling and improvement of stock."

Capital stock, $500,000 00.

Number of members, 145.

Extent of fair grounds, eighty acres, with a mile track.

Total receipts of the Association up to Jan. 1, 1870.....$2,722 95
Total expenditures " " " " 2,392 81

Since that time there has been paid in about $200 on stock of new members, making the assets of the Association at this time about $530.

Our first fair was generally considered a surprising success.

Among the most successful features were the fine displays of good blooded cattle of all ages, the specimens of pure blood in swine and sheep, and a few fine lots of poultry.

The vegetables on exhibition were of good quality, but the quantity was small. Fruits the same.

The display in the fine art department was of a superior order.

From the evidences constantly before us, together with those furnished by our first fair, agriculture and horticulture, and perhaps more especially the latter, *can* attain their highest perfection in this part of the country. But our county being new and its resources almost entirely undeveloped, we must look to the future. Our agriculturists are mostly men of large experience in the practice of their profession in the northern and middle States. We have many fruit-growers and nurserymen, whose liberal means were obtained entirely from the practice of the same pursuits in the North and East, who are now building up the business in this county on an extensive scale, with the most flattering prospects for success.

The annual election of thirteen directors for our Agricultural

Association took place January 1, 1870. The directors elect the officers, the day for which is set for January 15th, the result of which I will make known to you.

P. S.—According to promise, I should have answered you sooner. The officers elect of the Southwest Missouri Stock and Agricultural Association are as follows:

President—M. G. Skinner.
1st Vice President—I. N. Lamb.
2d " —Josiah Tilden.
3d " —W. G. Alexander.
Recording Secretary—H. A. Terpening.
Corresponding Secretary—E. H. Benham.
Treasurer—W. P. Davis.
General Agent—C. C. Allen.
Fair for 1870 to be held September 20th, 21st and 22d.

JEFFERSON COUNTY AGRICULTURAL AND MECHANICAL ASSOCIATION.

DE SOTO, January 1, 1870.

CHARLES W. MURTFELDT,

Corresponding Secretary State Board of Agriculture:

DEAR SIR: In compliance with your request, I herewith send you a statement in regard to the Jefferson County Agricultural and Mechanical Association. The society was organized in the year A. D. 1866, and labored under great difficulty in getting the united co-operation of the people in consequence of their not being able to agree upon the location for the fair grounds, but in the winter of A. D. 1867, a new impetus was given to the enterprise, and by voluntary subscriptions about $2,000 was raised, and the society commenced inclosing its grounds at De Soto. The first fair was held in the fall of 1867 with considerable promise of success. The enterprise, at first surrounded with embarrassments and difficulties, were greatly overcome by the energy and determination of our President, David W. Bryant, who took hold of the matter with a will to make a success, and the society's present prospects are largely due to him and Charles S. Rankin, and its Secretary, W. S. Jewett, for their interest and faithfulness under all embarrassments and difficulties in the early history of the association.

In the fall of A. D. 1868, the second fair was held, which proved an utter failure, in consequence of the inclemency of the weather. The third fair was held in the fall of A. D. 1869, and may be considered a success, it being able to pay the expenses and all premiums, and that exhibition, it can unquestionably be said, was the finest display

of fruit grown in the county ever presented, and would more than compare favorably with the display at the St. Louis fair. Jefferson county is peculiarly adapted to fruit culture, and we have a large number of the finest orchards and vineyards in the State, and that branch of industry is rapidly developing.

The Society, at its last exhibition elected Hon. Chas. S. Rankin as its President, and it can now be said is upon an established basis and surrounded with every promise of success.

The grounds have cost the society over $4,000, and they are indebted in about $500. The discords that heretofore interfered with its success are wearing away, and the people of the county are becoming united and interested in its prosperity. We are looking forward with the hope and belief that the Jefferson County Agricultural and Mechanical Association will, in a few years, have no superior in the State.

I am respectfully,

LOUIS JAS. RANKIN,
Treasurer and Secretary pro tem.

LAFAYETTE COUNTY AGRICULTURAL AND MECHANICAL SOCIETY.

LEXINGTON, LAFAYETTE Co. Mo., January 31, 1870.

MR. CHARLES W. MURTFELDT,
Corresponding Sec. Mo. State Board of Agriculture:

DEAR SIR: I have the honor to report the following abstract of this society: number of members 111. The financial affairs are in a healthy and solvent condition, being entirely free of debt with a small balance in the hands of the treasurer, with twenty-three acres of ground in fee simple with an amphitheatre entirely and substantially seated, one half under good roof with other out buildings, at a cost of six thousand one hundred dollars to the society. The number of premiums offered during the last year amounted to two hundred and twenty-five, embracing all articles of general interest, and for which the society paid out in premiums the sum of two thousand five hundred dollars, classified as follows:

Household articles	40
Culinary articles	20
Orchard and garden	15
Field	15
Agricultural implements	15
Sheep	10
Hogs	10

Cattle	20
Jacks and jennets	15
Mules	10
Horses	55
Total	225

The staples of the county consist as follows, together with the home market:

Hemp, one hundred and thirty-five dollars per ton.

Wheat, eighty cents per bushel.

Corn, sixty cents per bushel.

Oats, forty cents per bushel.

Barley, one dollar per bushel.

Fat cattle, three to four cents per pound, gross.

Fat hogs, seven to eight cents per pound, gross.

I have no data by which I can arrive at a proper estimate of the total amount of the same produced in the county.

The officers of the society are as follows:

M. T. Buford, President.

Robt. J. Smith, Vice President.

DIRECTORS.

Robt. Hale, Z. S. Mitchell, Mason R. Henry, John Carter, C. O. Grimes, W. A. Chanslor, and A. T. Winsor.

B. R. Neland, Treasurer.

J. M. McGirk, Secretary.

Hoping you will find my statement as full as necessary.

I remain yours truly,

J. M. McGIRK,

Secretary.

LAWRENCE COUNTY.

CHARLES W. MURTFELDT,

Corresponding Secretary Mo. State Board of Agriculture:

The Board of Directors report the condition of the Society, as follows:

The new fair grounds cost the Society $200, minus $50 of said cost donated—real cost	$150 00
Material (lumber) for improvement of same, cost $686 53, minus $25 of said cost donated—real cost	661 53
Work, incidentals, etc., inclosing the grounds, cost	194 60
Total cost	$1,006 13
The fair (Oct. 6, 7, 8 and 9) brought into the treasury of the society for eighty-one members, @ $2 50—$202 50, minus board $35. Ninety-one and five others @ $2 50	$167 50

Received from county court	150 00
Received from gate fees	140 20
Received from sales of vegetables and in fair	16 45
Received from per cents on entries of stocks	13 00
Received from subscriptions paid	86 00
Received from other subscriptions canceled in settlements.	15 00
Total receipts	$588 15

The liabilities of the society are as follows:

Incidentals	$ 8 00
Cash premiums	71 60
Bill of silver ware	328 50
Improvements on grounds	194 60
Sundry services	52 20
Purchase of grounds	150 00
Lumber and hauling	661 53
Total	$1,466 43
Leaving balance unpaid of	$878 28

At its last fair the society awarded 107 premiums at an aggregate cost of $400 10.

The specimens of fruit and vegetables on exhibition at the fair were not numerous, but were excellent in quality.

The specimens in ladies' work were in considerable variety, and were wrought with skill and taste.

The cattle exhibited were few in number, but in character they show a steady improvement in the county.

There were but few jacks, jennets and mules exhibited.

The specimens in mechanism and art were fine and meritorious.

There were but few agricultural implements on exhibition.

The hogs were few in number, and were of the Chester white and Suffolk breeds.

The Southwest was well represented in stallions, mares and geldings.

Col. Havens, of Springfield, delivered an address on the last day of the fair, which was highly entertaining, and fraught with practical ideas.

The election for a new Board of Directors was held, which resulted in the election of Wm. K. Gibson, G. H. Moore, J. W. Moore, J. D. Allen, F. L. Rutherford, A. G. McCause, J. W. Patton, James J. Cheery and E. G. Paris, as the Directors for 1870.

JOHN D. ALLEN,
President Board A. and M. Society.

J. H. WOODS, *Secretary.*

PHELPS COUNTY AGRICULTURAL SOCIETY.

FOR THE MONTH OF OCTOBER.

Although we have not yet been organized a year and have hardly started, still we will make a little report:

No. of members	28
Funds paid in	$28 00
Paid for books, etc	10 00
Cash in treasury	18 00

We have had no fair, and have no data from which to state the probable quantity of staple products of the county. The prices at present at the county seat is: wheat, $1 00; rye, 50 cents; oats, 30 cents; corn, 50 cents; potatoes, 50 cents; hay, $15 00 per ton.

Crops, as a general thing, are very good, with an average crop at 10, we report corn 11, wheat 12, rye 12, oats 13, barley 10, buckwheat 10, potatoes 11, sweet potatoes 10, beans 11, sorghum 10, tobacco 10, hay 14, apple 13, peaches 10, grapes 11.

E. W. BISHOP, *President.*

F. S. HUCKINS, *Secretary.*

10 being the average according to rule adopted by the Agricultural Bureau of Washington. C. W. M.

VERNON COUNTY AGRICULTURAL AND MECHANICAL ASSOCIATION.

NEVADA CITY, VERNON COUNTY, MISSOURI, January 7, 1870.

CHARLES W. MURTFELDT, ESQ.,

Cor. Secretary Mo. State Board of Agriculture:

DEAR SIR: Your letter requesting a report of the Agricultural and Mechanical Association for this county, held in this place October, A. D. 1869, has been received, and in compliance with your request, as well as discharging a duty which we owe to the law, we take pleasure in submitting the following report for the year eighteen hundred and sixty-nine:

The fair held in October last was the fourth annual fair held in this county, and was, at the time under the control of eighty-eight members, directed by the following officers of the association:

Harvey Karnes, President.

C. R. Scott, Secretary.

L. D. Roberts, Treasurer.

DIRECTORS.

R. G. Bryan, Enoch Yates, Albert Badger, J. L. Nichols, and T. H. Austin.

The fair ground is situated in the eastern portion of the town of Nevada City, the county seat of Vernon county, and is beautifully located on a high eminence and includes ten acres of ground, and if properly improved would make one of the most beautiful grounds in the State, but owing to the newness of the county, and the sparse population, the ground is not as well improved as we desire the present improvements, not amounting to more than five or six hundred dollars.

The fair commenced on the fifth day of October, and was continued through the two suceeding days and during each day the following articles were exhibited:

FIRST DAY. TEXTILE AND ART DEPARTMENT. PART I.

WORSTED QUILTS.—There were six entries under this head, and the entries were all beautiful. The first premium amounting to six dollars was awarded to Mrs. D. C. Hunter, of Nevada City, Missouri; the second premium, amounting to four dollars, was awarded to Mrs. H. Hunter, of Nevada City, Missouri.

COTTON QUILTS.—Under this head, there were three entries, and after much difficulty in coming to a decision, it was decided that the first premium, amounting to six dollars, be awarded to Mrs. W. W. Hill, of Vernon county, and that second premium be given to Mrs. H. Hunter, of Nevada City, which premium amounted to four dollars.

COUNTERPANES—There were five entries under this class, and the first premium was awarded to Mrs. Symms, of this county, who brought forward a most elegant specimen of workmanship. This premium amounted to two dollars. The second premium was given to Mrs. Collins, of Vernon county, valued at one dollar.

COVERLETS.—From the number of six entries the coverlet belonging to Mrs. Collins, of Vernon county, was the one selected as deserving the premium to be first given, and to her the first premium valued at two dollars was awarded. The second premium was presented to Mrs. H. Hunter, of Vernon county.

WOOLEN SOCKS.—Premium valued at one dollar awarded to Mrs. Bowman, of Nevada City.

WOOLEN GLOVES.—Premium awarded to Mrs. Duren, of Vernon county.

BUCK GLOVES.—Premium presented to Mrs. Collins, of Vernon county.

WOOLEN YARN, HANK.—Premium to Mrs. Burton, of this county.

CROTCHET WORK.—The specimens exhibited under this head were of exquisite skill and taste, and were five in number, the first premium, valued at two dollars, was borne off by Mrs. Tillottson, of this place. The second premium, valued at one dollar, was awarded to Mrs. Kaufman, of this county.

EMBROIDERY.—There were three contestants for the premiums to

be awarded on this occasion, and the first premium, valued at two dollars, was given to Mrs. Kaufman, of this county. The second, valued at one dollar, was awarded to Mrs. O. M. Nelson, of this place.

TATTING.—From the number of three entries, the work of Mrs. P. Drake, of Nevada, was selected as deserving the first premium, valued at two dollars, and the work of Mrs. Duren as entitled to the second premium, valued at one dollar.

BEAD WORK.—Under this head both premiums, valued at two or three dollars respectively, were awarded to Mrs. O. M. Nelson, of this place.

LACE.—Premium No. one, valued at two dollars, was presented to Mrs. Kaufman, Vernon county. Premium No. two, valued at one dollar, to Mrs. D. C. Hunter, of Nevada City, Missouri.

SLIPPERS.—Premium of two dollars awarded to Mrs. O. M. Nelson, of this town.

FIRST DAY. GALLINACEOUS DEPARTMENT. PART II.

BEST PAIR OF TURKEYS.—Premium of two dollars awarded to Mrs. Harvey Karnes, of Vernon county.

PAIR OF CHICKENS.—Premium given to Hugh Logan, of Vernon county, said premium was valued at two dollars.

FIRST DAY—AGRICULTURAL AND MECHANICAL DEPARTMENT. PART III.

PORTABLE FENCE.—Premium, valued at three dollars, awarded to W. W. Hill, of Vernon county.

PICTURE FRAME.—Both premiums, valued at three dollars, were given to A. B. McConoughey, of Nevada.

TWO-HORSE WAGON.—Three dollar premium awarded to Thomas H. Austin, of Nevada City, Mo.

LADY'S SADDLE.—Five dollar premium awarded to D. W. Mitchell, of Nevada City.

RIDING BRIDLE.—D. W. Mitchell received the premium of two dollars.

WAGON HARNESS.—To D. W. Mitchell, of Nevada City, was awarded the premium of seven dollars and a half.

SINGLE BUGGY HARNESS.—Presented to D. W. Mitchell, of Nevada City, the premium of five dollars.

STUBBLE PLOW.—E. Hill, of this place, received the premium of five dollars.

SHOW CASE, AND THE BEST ARRANGEMENT THEREIN.—Premium, valued at five dollars, given to Kahn & McNeil.

SECOND DAY.

WHEAT, BEST BUSHEL OF.—Two dollar premium to W. W. Hill, of Vernon county.

CORN, FIFTY EARS.—To Elias Dean, a two dollar premium was awarded.

OATS.—H. H. Bowman received a two dollar premium.

BEANS, WHITE.—One dollar premium to H. H. Bowman, of Vernon county.

POTATOES, IRISH.—To Elias Dean was awarded a two dollar premium.

POTATOES, SWEET.—Elias Dean received the premium of two dollars.

BEETS.—H. H. Bowman, of Vernon county, received a one dollar premium.

PARSNEPS.—H. H. Bowman received premium valued at one dollar.

PUMPKINS AND SQUASHES, COLLECTION.—To Alexander Wight, of Vernon county, was awarded a premium of one dollar.

APPLES, HALF BUSHEL.—The first premium, valued at two dollars, was awarded to Elias Dean, of Vernon county.

The second premium, valued at one dollar, was presented to Alex. Wight, of Vernon county.

PEARS, HALF BUSHEL.—To M. Duren was awarded a two dollar premium.

FRUIT, BEST COLLECTION.—A five dollar premium was awarded to J. L. Nickols, of this place.

FIRST DAY.—STOCK DEPARTMENT.

JACK, THREE YEARS OLD AND OVER.—Premium, valued at fifteen dollars, was awarded to P. W. Quinn, of Vernon county.

PAIR OF DRAFT HORSES OR MARES.—Thomas H. Austin, of Nevada City, received the premium valued at ten dollars.

SECOND DAY.

BOAR OF ANY AGE.—Four entries were brought forward under this head, and after much consideration, the first premium, valued at ten dollars, was awarded to T. E. Parker, of Vernon county.

The second, valued at five dollars, was awarded to John Brown.

SOW OF ANY AGE.—After carefully examining the four entries that were brought forward, the first premium was given to John Brown, of Vernon county. It was valued at ten dollars.

The second premium, valued at five dollars, was given to T. E. Parker, of Vernon county.

BULL, THREE YEARS OLD AND OVER.—Premium, valued at fifteen dollars, was awarded to J. P. Dimmit, of Vernon county.

BULL, ONE YEAR AND UNDER TWO.—A premium, valued at six dollars, was awarded to J. Clinton, of this county.

The second premium, valued at four dollars, was given to John Brown, of this county.

BULL CALF.—First premium, valued at six dollars, was awarded to J. Clinton, of this county.

Second premium, valued at four dollars, to Joe. I. Moore, of this county.

Cow, Three Years and Upward.—Premium, valued at fifteen dollars, awarded to G. W. Symns, of this county.

Second premium, of seven dollars and a half, was awarded to Joe. I. Moore, of Vernon county.

Cow, Two and Under Three Years.—A. W. Edwards, of Vernon county, received the first premium, valued at ten dollars.

The second premium, of five dollars, was awarded to Clinton, of Vernon.

Heifer Calf.—Both premiums, valued at three and five dollars, respectively, were awarded to Joe. I. Moore, of Vernon county.

SECOND DAY—SWEEPSTAKES.

Bull, any Age.—J. Clinton received the first premium, valued at twenty dollars.

J. P. Dimmit received the second premium, valued at ten dollars.

Cow, of any Age.—A twenty dollar premium was awarded to A. W. Edwards, of this county. and to J. Clinton, also of Vernon, was awarded a premium of ten dollars.

STOCK DEPARTMENT—CONTINUED.

Milch Cows.—Joe. I. Moore received the first premium, valued at ten dollars, and the second premium, valued at five dollars, was given to G. W. Symns, of Vernon county.

Fatted Cow or Steer.—A ten dollar premium was awarded to G. W. Symns, of Vernon county, and to O. M. McGinnis, of the same county, was presented a premium valued at five dollars.

Steer, Two and Under Three.—First premium to Joe. I. Moore. of Vernon county. Said premium valued at six dollars.

Second premium, valued at three dollars, to G. W. Symns, of Vernon county.

Steer, One Year and Under Two.—Both premiums, valued at five and two and a half dollars, respectively, were awarded to Harvey Karnes, of Vernon county.

Sweepstakes for Ponies Under Fourteen Hands.—A ten dollar premium was awarded to Hardin Nelson, of Vernon county, and a five dollar premium to R. T. Ellis, of this county.

Sweepstakes for Draft Horses, Mares or Mules.—Premium of fifteen dollars awarded to Thomas H. Austin, of this city.

THIRD DAY—STOCK DEPARTMENT—CONTINUED.

Stallion, Four Years Old and Over.—Erasmus Foland, of this county, received a premium, valued at fifteen dollars.

Stallion, Two and Under Three.—A premium, valued at six dollars, was awarded to A. P. Jones.

STALLION, ONE AND UNDER TWO.—Premium of five dollars was awarded to a very fine animal belonging to O. Hulburt, of Vernon county.

STALLION COLT.—First premium of five dollars, was awarded to G. W. Symns, of Vernon county, and the second premium to Charles Myres, of same county.

BROOD MARES.—R. T. Ellis received the first premium, valued at ten dollars, and the second was awarded to Charles Bartlett, of this county. Said premium valued at five dollars.

MARES, THREE AND UNDER FOUR.—An eight dollar premium was given to S. P. Symns, of this county.

MARES, TWO AND UNDER THREE.—First premium, valued at five dollars, awarded to W. S. Willoughby, and the second premium of three dollars was given to Jasper Shanholster, of Vernon county.

MARES, ONE AND UNDER TWO.—David Wright, of Nevada City, received the first premium, valued at five dollars, and a second premium valued at three dollars, was presented to Robert Ellis, of this county.

SWEEPSTAKES—MARES OF ANY AGE.—From five entries a mare belonging to P. M. Wray was selected as the one entitled to the premium, valued at fifteen dollars, and a second premium, valued at ten dollars, was given to S. P. Symns, of Vernon county.

STALLION OF ANY AGE.—First premium of twenty dollars was awarded to A. P. Jones, and the second premium of ten dollars was presented to O. Hulburt, of Vernon county.

HORSE OR MARE IN SINGLE HARNESS.—First premium, valued at ten dollars, was given to J. L. Nickols, of Nevada City, and to Wm. McGinnis, of Vernon county, was awarded the second premium, valued at five dollars.

HORSES OR MARES IN DOUBLE HARNESS.—J. L. Nickols, as before, took the first premium, valued at ten dollars, and to V. C. Quick was awarded the second premium, valued at five dollars.

FASTEST TROTTING HORSE OR MARE IN HARNESS OR UNDER SADDLE.—A prancing black, belonging to J. L. Nickols, was again successful, and to him was awarded a ten dollar premium, and the second premium, of five dollars, was given to G. W. Symns.

MARE OR HORSE UNDER SADDLE.—In this ring five entries were brought forward, and, after a hard contest, the premium, valued at ten dollars, was awarded to C. R. Scott, his horse, Umpire, being victorious, and to Dr. Blake, of Nevada City, was awarded the second premium, valued at five dollars.

SLOWEST HORSE OR MARE.—Premium of ten dollars awarded to M. Duren, of this county.

MULES, THREE YEARS AND UPWARDS.—First premium of ten dollars was given to H. H. Johnson, and the second premium of five dollars was given to W. T. and C. E. Harness.

PAIR OF MULES.—John Brown received a premium of ten dollars.

SWEEPSTAKES FOR MULES.—The first premium was awarded to John

Brown, which premium was valued at ten dollars, and the second premium, valued at five dollars, was given to Charley Harness.

THIRD DAY—CULINARY DEPARTMENT.

MOLASSES, SORGHUM.—R. M. George, of this county, received the premium, valued at two dollars, and to Mrs. Symns was awarded a premium valued at one dollar.

PRESERVES, PEACH.—Both premiums, valued at three dollars, were awarded to Mrs. O. M. Nelson, of Nevada City.

PRESERVES, APPLE.—First premium, valued at two dollars, was awarded to Mrs. O. M. Nelson, and the second premium, valued at one dollar, was given to Mrs. James H. More.

PRESERVES, CHERRY.—Premium, valued at two dollars, was awarded to Mrs. O. M. Nelson, of this place.

PRESERVES, PLUM.—Two dollar premium was given to Mrs. O. M. Nelson.

JELLY, JAR, OF.—First premium, valued at two dollars, was awarded to Mrs. Karnes, and the second premium, valued at one dollar, was given to Mrs. Duren.

PICKLES, SWEET.—Mrs. Bowman received a premium valued at two dollars, and the second premium, valued at one dollar, was given to Mrs. O. M. Nelson, of this place.

CATSUP.—Premium of two dollars awarded to Mrs. Bowman.

CAKE, PLAIN, POUND.—First premium, valued at two dollars, was given to Mrs. O. M. Nelson, and the second, valued at one dollar, was awarded to Mrs. Duren.

CAKE, SPONGE.—Two dollar premium awarded to Mrs. Duren.

BREAD, LOAF.—Mrs. C. R. Scott, of Nevada City, received a two dollar premium.

CHEESE.—Mrs. H. A. Wright received a five dollar premium.

BUTTER, MAY.—First premium, valued at two dollars, was given to Mrs. Duren, and the second premium was awarded to Mrs. Fishpool, of this county.

BUTTER, FRESH.—Premium of two dollars was awarded to Mrs. James More, and the second premium was given to Mrs. Fishpool.

This completes the list of articles that were exhibited at the Vernon county fair for the year 1869, but, as the law requires that we should make a report as to the crops in our county, we must, before closing, do so.

The staple commodities of this county are wheat, corn and oats, and last year the crops were very good. Corn is now worth fifty cents per bushel, wheat from fifty to ninety cents, and oats fifty cents.

The county, at some day not far distant, promises to be one of the foremost in the State. It has great advantages even over some of the older counties, as it far excels them as a stock county, being peculiarly adapted to that purpose, Also it has great advantages over most of the counties in the State as regards fuel, there being plenty

of timber for all purposes, and innumerable coal banks of the greatest abundance.

Our county also has one railroad in process of construction, and a very flattering prospect for a second, to be commenced very soon. Should we be so fortunate as to get both, we will, in a few years, increase greatly in population, and soon double our number not only in the county seat, but throughout the county.

For farming purposes, we have generally a fine quality of soil throughout the county, and with proper cultivation no doubt it will yield equal to any soil in the State.

I submit the above as the report for the Vernon County Agricultural and Mechanical Association.

Very respectfully

C. R. SCOTT, *Secretary.*

WASHINGTON COUNTY.

CHAS. W. MURTFELDT, ESQ.,

Corresponding Secretary, etc.:

DEAR SIR: I herewith submit my annual report of this county for the year 1869. By reference to my report for 1868, it will be seen that highly gratifying progress had been made during that year, both with regard to the advancement and prosperity of our County Agricultural Association and those community interests, of which it is the legally constituted guardian and patron. I am gratified to know that the present report will furnish incontrovertible evidences of still further progress in these important interests.

The list of premiums presented by our County Association for premiums in its third annual fair, embraced an aggregate of about twenty-five hundred dollars, a sum quadruple that of the first, and double that of the second annual exhibition. The catalogue was published early in the season, affording farmers, stock-raisers and mechanics ample time in which to shape specimens of their various products for competition. The work of the committee on premiums was thoroughly and judiciously performed, and the premium list was, so far as I have been able to learn, eminently satisfactory to the large classes in competition. The list was, with the exception of the county court list, and a few individual premiums, thrown open "to the world" for rivalry.

Our third annual fair was opened on Tuesday, September 28th, 1869, and continued for four days. The announcement was that it would be held for three days, but the increasing attendance and interest of each day forbade its closing before the evening of the first day of October. The receipts were in increase of those of the preced-

ing year on the full ration of premiums, and more than justified the highest expectations of the directorate.

The various departments of the exhibition were highly creditable to the producers of the county, as well as to their respective superintendents.

Of several of these departments, in which I was compelled, in my last report, to notice marked shortcomings, as especially in blooded and thoroughbred cattle and hogs, I am happy to state that a marked improvement was shown. During the past year, Frank Harris, Esq., (a member of our county board) has contributed materially toward supplying the deficiency. Mr. Wm. Riehl has also established an experimental stock farm in the vicinity of Potosi, and is actively engaged in preparing it for the rearing of fine stock of every utilized breed. Other like enterprises are in progress, and we have every reason to believe that the present year will furnish a record unprecedented in the history of our county.

In the various classes of mules and horses, particularly the latter, the exhibition was highly creditable. I may be permitted, in this connection, to mention the fine thoroughbred stallion, "Andy Johnson," owned by Judge David E. Perryman, of this county, as well as the stables of Messrs. John T. Robinson, George Towl, Mahlon Hughes and others.

Our county is fast becoming supplied with fine and serviceable stock.

The textile fabric, art and mechanical exhibitions were in every respect creditable to their respective contributors, and to the energy of the board in preparing for and arranging them.

The success of the fair, as an entirety, was best attested by the fact that the Association's unsold stock was sought and taken, to some considerable extent at the close of the exhibition.

The following exhibit will show the status of stock in the county for the last year:

2,554	horses,	valued at	$113,240
808	mules,	"	43,680
7,533	cattle,	"	78,430
7,444	sheep,	"	10,730
12,959	hogs,	"	19,590

The comparative returns for 1869 show a small increase in live stock over the returns of the preceding year.

In the way of cereals and other farm products, I regret to say that, no assessment having been made of them during the past year, I am unable to present all those interesting facts which I would desire to.

Notwithstanding the great lumber and lead interest which have their center point preeminently in this county, we have also large bodies of desirable fertile lands, which have been lying idle to a con-

siderable extent during the last ten years, which have been but recently sought out, and will soon be in a high state of cultivation. Aside from the Agricultural Association of the county, a prosperous and active Farmer's Club, holding its semi-monthly session at various points in the county, bears attest to the increasing interest in the ennobling pursuits of agriculture.

The physical character of Washington county would be classed as more specific than varied, the entire northern and eastern portions being exposures of third magnesian limestone, with sandstone, drusy quartz and nodular cherts capping the hills and hill slopes.

The southern portion has surface exposure of lower third magnesia or lowest silurian ranges. There is a moderate development of the laurentian or taconic system, with its characteristic red sandstones, talcoid slates, calciferous or Pottsdam sandrocks and conglomerates, brecciated early materials. All these sets of rocks shelve southwardly, upward, with the surface slopes of the many oblong and mound-shaped hills of granite, porphyry, trap scyenite and other augitic rocks there found. In no part of the State are there soils more particularly adapted to the growth of certain highly-valued fruits and vegetables. The combined soils to be found in the wide valleys and basins inclosed by those primitive rocks being, as they are, derived from the rocks best calculated to impart desirable and lasting qualities to soils adapted to the production of cereals, root crops, grasses or fruits.

What the central, eastern and northern portions of the county lose thereby from the absence of any primitive rocks, is fully made up in the wonderfully profuse exhibition of sulphate of barytes, now becoming so important an item in the exportations of this county, amounting to the shipment of four thousand tons for the year, from one station on the Iron Mountain railroad, and native carbonate of lime, respectively known, locally, as bald and glass tiff.

Millions of tons of the former too impure for any commercial use, except the manufacture of putty, can, when properly subjected to a simple system of cheap chemical decomposition, be utilized. It then becomes a fertilizer of the first order, combining more enlivening and enriching qualities than New Jersey marls, phosphate of lime, or much of the adulturated stuff sold as guano.

The lumber trade of the county for the year shows but little increase of that of 1868, owing to the almost complete stagnation in that branch of our commerce during the last three months of 1869, and corresponding suspension of its manufacture. The one item of shipments from Potosi depot, alone, to St. Louis, will give some adequate idea of the extent of this branch of our industry. From the first day of January to the 31st day of December, one thousand five hundred and thirty-nine car loads, containing nine million nine hundred and ninety-seven thousand feet were shipped as above.

The mining and manufacture of lead is, as stated in previous re-

ports, a large item in the resources of our county. I had hoped to report the extent of this branch of our industry in full, but have been unable with the greatest pains-taking, to obtain full returns for the year, therefore subjoin the statements of nine (about one-half the entire number of furnaces in operation in the county), inclusive only of manufactures from January 1st to December 31st, 1869, inclusive:

Proprietors.	Location.	Pounds.
Wm. Long	Old Mines	781,558
St. Louis Lead Mining Co	Kingston furnace	543,502
James Long	Potosi	374,000
Firmin Desloge	Potosi	336,000
J. & J. Lalty	Cadet	315,409
Mo. and Penn. Lead Co	Harmony	260,540
John Evans	Hopewell	235,600
Teasdale & Co	Potosi	117,961
Jacob Boas	Mineral Point	109,160

Making an aggregate from nine furnaces, alone, of three millions seventy-three thousand and seven hundred pounds. In this connection allow me to recall the statement made by Prof. J. D. Whitney, in his work published in 1854, on the mineral wealth of the United States; he estimates the entire yield of lead in Missouri for the year 1852 at fifteen hundred pigs, or about one hundred and five thousand pounds.

Another important feature of the manufacturing interests of this county is the iron furnace of Messrs. Edwin Harrison & Co., at Irondale; this firm manufactured at their Irondale furnace from the first day of January to the 31st day of December, 1869, inclusive, seven thousand five hundred and forty tons, of two hundred and sixty-eight pounds each, an aggregate of seventeen millions one hundred thousand seven hundred and twenty (17,100,720) pounds. This furnace gives employment, directly and indirectly, to about 175 hands (and superintendents), involving an outlay in the item of labor of $100,000 per annum. The ore used in these works (ninety-five per cent. of it) is obtained from Iron Mountain. A large proportion of the supplies consumed by this manufacturing community, such as corn, hay, oats, hogs, lumber, etc., are bought in this county.

The zinc interest, mentioned in my last report, has developed a new phase since that date. The experimental furnace then mentioned as having been erected at this place by Mr. Geo. F. Hesselmeyer, was built and operated for several months, to determine the practicability of bringing the large amounts of coal required in zinc smelting to the vicinity of the mines, and transporting the manufactured article to market, rather than to transport the crude ore to the vicinity of the coal beds for manufacture.

The latter method proved the only practicable one, and Mr. Hesselmeyer abandoned the works at Potosi transferring his operations to his new furnaces at Carondelet. I am unable to give you the

amount of zinc ore produced at the several mines in this county during the year, further than may be indicated by the shipments from the one depot, at Hopewell furnace. Mr. John Evans shipped from that station, during the year, nine car loads of zinc ore, weighing five hundred and eighty thousand pounds.

From these meagre statistics, one might well wonder at the spectacle of a fund designed by the General Assembly for the endowment of a school of mining and metallurgy, traversing the entire length and breadth of the State, in the vain quest of a mining centre for its location. *Verbum sapientis, etc.* GEO. R. CLARK, *Secretary.*

NORTH MISSOURI AGRICULTURAL AND MECHANICAL ASSOCIATION.

HANNIBAL, Mo., December 28, 1869.

HON. CHAS. W. MURTFELDT,
Corresponding Secretary State Board of Agriculture:

DEAR SIR—Yours of the 22d received and contents noted. Our board of directors, on the 24th inst., passed the following resolution:

Resolved, That the Secretary forward to Charles W. Murtfeldt, Corresponding Secretary State Board of Agriculture, a full and complete report of all matters connected with our association.

In compliance with such order and your letter, I have the honor to report as follows:

This association was organized on the joint stock plan, under the general incorporation laws, and the articles of association were filed in the office of the Secretary of State in June 12, 1869. There are about one hundred and twenty-five stockholders, principally citizens of Marion, Ralls, and Monroe counties. The board of directors first elected, and who transacted the business last year, were William Newland, President; Jamison F. Hawkins, Vice President; A. E. Trabue, Joseph M. Gentry, J. N. Peyton, A. W. Lamb, J. J. A. Jacoby, Samuel C. McClune, Thos. Bowling, C. F. Kirtley, B. F. Griffith, E. G. Matson, W. A. Munger. All of the old directors were re-elected, except J. J. A. Jacoby and Samuel C. McClune, whose places were filled by John L. Lathrop and John Nichols. The present officers are A. W. Lamb, President; A. E. Trabue, Vice President; George H. Shields, Secretary and Treasurer.

The first fair was held the week beginning September 20, 1869, and was well attended. We had an aggregate attendance of about twenty-four thousand people. On Friday, the most attractive day, the attendance was about ten or twelve thousand. The show of stock was rather smaller than at such fairs, owing to the fact of the lateness of our getting ready and advertising, which was not done till late in

August, but we expect a much larger display hereafter. The mechanical and agricultural department was largely represented, and the display unusually fine. Machinery for every conceivable purpose was on exhibition, and many of great utility. The textile fabric, fine art, and household product departments were filled to overflowing, and probably such a display was never before seen in this part of the State. The whole population seemed to vie with each other in these departments, and a magnificent result followed. The fowl, swine, and sheep displays were good. Altogether the exhibition was first class, and, except the paucity of fine horses, was as good as any district fair in this region of country.

In the cattle show, very fine stock was displayed, and it constituted one of the principal features of the fair.

The whole receipts were $7,208 79, and total expenses $4,995 15, showing net profits of $2,203 64. These profits were all swallowed up in paying for our improvements, so that the association made nothing clear. It is merely stated to show the actual receipts and expenses during the fair. The improvements consist of a large and commodious amphitheatre, one-half thereof finished; the area the same size as that of the St. Louis fair grounds, capable of seating 10,000 people; a large textile fabric hall, a ladies' cottage, sheds for mechanical and agricultural implements, two hundred and fifty stalls for cattle and horses. The grounds are fifty-two acres in extent, and inclosed with a nine-foot fence, close boarded, and are situated about two miles from Hannibal, on the Hannibal and St. Joseph Railroad, and about one hundred yards south of the Hannibal and Paris plank road, and immediately south of and adjoining the Hannibal and New London gravel road, and hence is easy of access from every direction. Forty acres is as level as a floor, and shaded with large elm, maple, and oak trees, making it the most desirable resort in summer for all pleasure parties. The other ten acres is hill and dell, and divided from the plain by Bear Creek, which runs through the whole extent of the grounds east and west, and a rivulet of living water fed by many springs flows through the whole extent of the grounds north and south, affording abundant water, clear and pure, for every purpose. Wells have been sunk with force pumps in all parts of the ground for the use of man and beast.

The amphitheatre is encircled by a half mile track, fifty feet wide and perfectly level, and with the improvement thereon contemplated during the next year, it will be one of the best tracks in the country.

The main premiums for stock were carried off last year by Lewis, Monroe, Marion, and Ralls counties for horses, and Pike and Monroe counties for cattle, Marion for hogs and sheep, and Boone, Marion and Ralls for textile fabrics.

In regard to our enterprise, we consider it unusually successful, and while for a few years we must apply all the earnings of the association to improvements on the grounds, we hope to be able to not

only make our fairs a success, but to return a dividend to the stockholders.

Our object will be to offer large premiums in a judicious way, to induce fine stock, and all exhibitors to come to our fair. Our next fair will be held the week previous to the next St. Louis fair, so that parties on their way to St. Louis can stop here on their way down the river and railroads.

Hannibal now has railroad connection with the East and the West, and the river brings trade from north and south, and the early completion (which will, no doubt, soon come to pass) of the Hannibal and Central Missouri Railroad, connecting with the North Missouri and Kansas City Railroads at Moberly, will give us another feeder, and we expect that our next exhibition will be the best in the State (except the world-renowned St. Louis fair), and if earnest endeavor and active work will bring about that end, it will be done.

Our premiums last year were part in solid silver plate, but the directors have seen that the day of plate premiums has passed, and hereafter the premiums will be in all instances paid in cash.

Hoping to be able to give you a full and complete history of another successful exhibition next year, I have the honor to remain, very respectfully, your obedient servant,

GEO. H. SHIELDS,
Secretary N. Mo. A. and M. Association.

NORTH MISSOURI STOCK, AGRICULTURAL AND MECHANICAL ASSOCIATION.

SALISBURY, Mo., December 25, 1869.

CHAS. W. MURTFELDT,
Corresponding Secretary State Board of Agriculture:

DEAR SIR—Yours of the 22d instant, directed to the Secretary of the North Missouri Stock, Agricultural and Mechanical Association, has been handed to me.

In reply I will state that this Association organized in 1848, with some eighty stockholders. Capital stock, $6,000.

This Association is doing good work in encouraging the importation and raising of fine stock.

We have a good half mile track for trials of speed.

Our Association has well improved grounds near the railroad, one-half mile from this town.

The entries of stock were large, most of the rings having strong competition.

Our premium list amounted to $4,000.

From past experience I am confident our county "fairs" will have to change their programmes in regard to *entries* and "dead heads," and offer premiums for their own county stock, excluding the stock from other counties in a portion of the rings.

A convention of the officers of our fairs ought to be held to consult on these important subjects.

Your obedient servant,

LUCIUS SALISBURY,
President N. M. S., A. and M. A.

Essays And Other Papers.

ADDRESS OF

NORMAN J. COLMAN,

BEFORE THE

MO. EDITORS AND PUBLISHERS' ASSOCIATION.

GENTLEMEN OF THE ASSOCIATION: The power of the Press is now pretty well understood, and by none better than the editorial profession—but, it is doubtful whether the duties and responsibilities of the Press are generally as well appreciated. Like all other professions, the Editorial has grave and responsible duties devolving upon it—but, unlike others, certain prescribed qualifications have not been required before entering upon the discharge of professional duty. No attendance in the lecture hall, or particular course of study, or training, has been exacted. The Teacher, the Physician, the Lawyer and the Divine, must each undergo a thorough preparatory course, before being permitted to enter on his chosen career. Schools and colleges must be attended, lectures listened to, and thorough examinations undergone, before a license will be granted to enter the arena of the profession. An *Esprit de Corps* is thus cultivated, which is lasting and attended with the most beneficial results. But any particular training, or course of study, or lectures, or schools, or colleges, to prepare young men for the most important of all professions—the Editorial—have never been heard of. That institutions of this kind could be established, and would be attended with the most beneficial results, can scarcely be doubted. Each member of the profession has now to learn for himself all that is to be known of the duties devolving upon him.

It may be thought by some that these duties are not so very grave nor responsible. But this is a great mistake. What other profession is of equal responsibility? It is that of the Teacher or Divine. Is not the Press the great instructor of the age? Does not every good and noble cause require an enlightened and virtuous Press to uphold

it? While the Teacher and Divine are instructing a few hundred—for they can be heard by but few—the Editor is swaying the minds of thousands, and sometimes of hundreds of thousands. He has a larger field for the exercise of his powers and influence, and by some mysterious law his instructions are taken in with more avidity. The newspaper is now read almost everywhere, and its silent, yet powerful, influence is constantly working upon the minds of all, young and old, of both sexes—not less in the cabin of the backwoodsman than in the mansion of the millionaire.

But while it is true that the other professions have been greatly benefitted by special preparation, and that such preparation is a wise provision for proper qualification and special excellence—yet the Press stands as the personification and guardian of perfect freedom. It has no iron door of entrance sentineled by grim Satyrs, demanding your parchment. The field lies open, whether inviting or otherwise, and every aspirant for its honors can enter it unmolested. He will stand or fall in accordance with his merits, and take rank according to the powers he possesses. The wants of the hour and the capacity to fill those wants, are the grand criteria of success—and a law as unerring as gravitation assigns the true position.

One of the most obvious and important duties devolving on the Press is the elevation of the people—not only in their ideas and feelings, but in their language and modes of expression. There is too great a tendency to think and write in the commonest terms instead of elevating the people, in the expression of their thoughts, to the highest standard of purity. Vulgarity in speech is bad enough—but to behold it in print, to take it home to our families, to introduce it in our parlors and libraries, to familiarize our wives and children with it—is far worse.

It is always better to deal with facts and principles than with individuals. In this way personalities are avoided, and the truth sooner reached. The *man* should not be degraded that the *cause* may be advanced or retarded.

Doubtless one of the leading objects had in view in the organization of this Association, was to bring the members of the Press of this State into a closer and more intimate relationship with one another; that those social and professional courtesies might be cultivated that should always exist among the members of an honorable profession. We are generally more courteous in tone and bearing, in word and deed, to a personal acquaintance or friend, than we are to a total stranger, who may entertain opinions different from ours—and anything which is calculated to elevate the tone of the public Press, is certainly deserving of attention. It is not ourselves, alone, as a profession, that are benefitted, but the whole reading public. The Press either elevates the tone of the public mind or debases it—depending upon the manner in which it is conducted. If conducted upon high and honorable principles—the public mind is elevated in a corres-

pending degree. But if untruthful, reckless statements and assertions are published as truthful, the tone of the public mind is gradually debased, becomes as familiar with falsehood as truth, and pays but little credence to anything that is published. How truthful are the lines of the poet in this connection, when he says:

"Vice is a monster of such frightful mien,
As to be hated, needs but to be seen—
Yet, seen too oft, familiar with her face,
We first endure, then pity, then embrace!"

What a text is this for a sermon. If these lines are true, what a fearful responsibility rests upon the Editorial profession. How guarded should they be as to what appears in their respective journals. It is the familiarity with vice in all its forms, which is having so corrupting an influence upon the public morals. Newspapers, now-a-days, are read by all classes—the high and the low, the young and the old, the school-boy and the school-girl. Every word that is printed leaves its impress for good or for evil. How important, then, that every journal should be the staunch and earnest friend of religion, morality, virtue and every noble attribute of man. Newspapers are now the great teachers of the world. They inform, instruct, guide and direct the people of all nations. Through their influence one great political party is in power to-day and another to-morrow. The importance, then, of a virtuous, patriotic Press is self-evident. How else can our liberties be preserved, or our individual rights be maintained! To use a homely expression, the members of the Press should be the watch-dogs over the liberties and rights of the people. They should resist to the bitter end every encroachment upon either. In all matters affecting the people, they should be controlled only by motives of the purest patriotism and philanthropy. They should be found willing and eloquent advocates of all measures having the good of the people in view. The establishment of schools and churches, the advancement of all public interests, the development of the resources of one's locality—are all matters that should enlist the heartiest efforts of those who wield so powerful an influence upon the public mind.

The Press of Missouri in particular have grave responsibilities devolving upon them. They have important duties to perform. They are, to a great extent, responsible for affairs as they now exist here—or may hereafter exist. They can advance or retard the car of progress. They can elevate the people, infuse into their minds a spirit of enterprise and progress in every worthy undertaking. They can unfold to our people, and to the people of other States, the wonderful resources with which our State has been blessed. By this means they will invite immigration and capital, and build up Missouri to that high and majestic position, which she is yet, sooner or later, destined to attain.

And what are the advantages, and what the resources, which our

State possesses over others? Agriculture is said to be the very foundation stone on which is reared the prosperity of any State or nation. How does Missouri compare with her sister States in this great industrial pursuit? She is centrally located, and in the most desirable latitude that could be selected for this great vocation. Her soil produces all the cereals in their greatest perfection, and she possesses the best hemp and tobacco lands on this continent. In the southern part of the State, cotton, of a fine quality is likewise produced. The advantages of our climate are not to be overlooked. Farm operations, of some kind or other, can be prosecuted the year round. This gives the Missouri farmer great advantages over his more northern competitors. In the Northern States farm work is all crowded into a few months, instead of extending over the entire year as here. *There* the farmer is, emphatically, snow-bound and frozen in half of the time, thus dwarfing all his operations and preventing him from performing more than half of the work here accomplished with the same amount of labor.

With the stock grower, the advantages in Missouri are still greater. In fully one-fourth of the State—the southern quarter—all kinds of stock will thrive the year round with but little attention from man. The herds are turned out to shift for themselves—and keep in good order the entire year. It is doubtful whether more desirable locations for raising stock can be found anywhere than are offered in Southern Missouri, when all the advantages are taken into consideration, not the least of which is its accessibility to a good market at all seasons. Stock is easily raised, it is true, in Texas—but the great distance from a good market causes it to sell at ruinously low figures. Stock can be raised just as cheap in Southern Missouri, and will command three or four times the price. In the more northern portions of the State several months of feeding are required—but our winters there, even, are much shorter than in more Northern sections, where stock must be fed from six to eight months, or it will starve. The stock grower must work diligently all summer to produce the necessary food for winter, and the profits of the business are generally found on the wrong side of the ledger.

In the production of Fruit, our State stands unrivalled. Our apples, pears, peaches, and, in fact, all our fruits, bear off the palm, and are the wonder and surprise of our Eastern friends, when they visit us. All parts of the State are adapted to the production of these, in their greatest perfection. It can be truly said, that Missouri is the Paradise of the Fruit Grower.

But what can we say to adequately express the value of our lands for the production of grapes and wine? What other State can compare with it in these respects? Where else in this country are such facilities offered to the Vineyardist, as here? Our wine will vie in quality with any made on this continent, and is attracting the favorable attention of the wine connoisseurs of Europe. At the great

National wine trial, held at Philadelphia a few years since, Missouri bore off the prize—a citizen of Boonville taking the first premium for the best wine on exhibition; and in Paris, at the great exhibition, it made a most favorable impression, and was highly commended by the best judges, as we are informed by the Hon. Marshal P. Wilder. We have millions of acres of the best grape lands in the world—more than all Europe possesses—that are now lying idle, only awaiting the hand of industry to develop their untold wealth. In a few years, it is to be hoped, these lands will be peopled by an intelligent, industrious population, and covered with orchards and vineyards, almost groaning under their precious burdens. Could the people of the Old World, or of our older States, know of the bright prospects our State offers to the immigrant—how soon would our population be quadrupled.

It is almost needless to speak of our inexhaustible mines of iron, lead, tin, coal, &c. To-morrow, you will behold the most wonderful phenomenon of mineral wealth on the face of the globe—a mountain of iron—that would furnish enough of this metal for all the world for centuries. Iron is the most important mineral the earth produces. It is indispensable in every industrial pursuit, and enters into more general use than any other metal. Without it, our fields could not be cultivated. It is used in a hundred forms on every farm and in every workshop in the land. Large establishments are now being erected by some of our wealthiest and most enterprising citizens to utilize this material, with which our State is so wonderfully supplied. Capital, enterprise and skill alone are wanting to make this one of the greatest sources of wealth to Missouri. Look to the matter of railroad iron alone. Take St. Louis as the focus. See the thousands of miles of iron rail radiating from this city. Contemplate the thousands of miles yet to be constructed from the city, or from roads leading thereto—for railroads will yet be as common as M'Adamized roads, as every county seat and town of any importance will have its railroad connections. Shall we always depend upon Great Britain to supply the iron to lay the tracks, or re-place them when worn out? Shall we send millions of dollars across the Atlantic annually for the very material which is lying in profusion at our feet? We have, too, most of the other important metals is nearly as great abundance.

Vast forests of pine are to be found in the Southern portion of the State, but awaiting the hand of industry to turn them into sources of wealth.

My time does not allow me to dwell longer on this subject—but the Press of the State can confer no greater boon upon her people than by giving their hearty aid in the development of the varied resources we possess. We must let the world know of our advantages of position, of climate, of production; of our agricultural, manufacturing and commercial wealth.

We have thousands of miles of streams, unsurpassed for water-

power. These should be harnessed and made useful allies in the development of our wealth and resources. Upon these streams, large manufacturing establishments should be erected, to turn our raw productions into useful fabrics, and to give labor to our population.

In my travels through different parts of the State, I have been astonished at the multitude of rivers and smaller streams which traverse almost every county, eminently suited for the purposes of power, and many of them peerless in this respect. There is the beautiful Meramec, which flows almost along the borders of this city, and capable of driving a hundred great mills seated along its course. Further southward flow the St. Francois, the Current, the Black; and towards the southwest, the Neosho and the White; westward of here and south of the Missouri, are those rapid and copious rivers, the Gasconade—the Osage, the clear waters of which dancing and dashing along its channel in rapid descent, might furnish power equal to the Passaic, and support upon its shores several such cities as that busy and prosperous Patterson, which owes all its thrift to the waters of the Passaic—the South Grand, the Lamine, the Black Water, the Big Blue—whilst on the other side of the Missouri are those rivers, each of which by the weight of its leaping waters, ought to support an opulent and populous manufacturing city—the Chariton, the Grand, the Salt, the Platte, and others. All these rivers, and their tributaries, are spread in a vast net-work over our State, and contain within themselves, when brought into practical application, a wealth and power of industrial resource not easily to be estimated and scarcely possible to be overstated.

The cheapness of our lands as well as their great fertility and adaption to all kinds of crops, must not be lost sight of.

By a constant and well-directed effort on the part of the Press of Missouri, the stream of immigration, which is now flowing into the State, will be accelerated and enlarged, and Missouri ere long take the high and grand position which the God of Nature formed her to occupy as the Empire State of this great confederacy.

But, here, we shall not stop! When that glorious era dawns—as it surely will—St. Louis will have become the Capital of the nation. It requires no prophetic vision to fortell that the Valley of the Mississippi is yet to control the legislation of the country. At our next apportionment for members of Congress, the people of the Eastern States will open their astonished eyes, when they behold the power the West will have in the councils of the nation. It will then, probably, have become the controlling power: or, if not, but one more census—another decade—will be required to develop the fact, that the sceptre of power has been transferred from the East to the great Valley of the Mississippi. When that time comes, St. Louis will be crowned the Capital of the nation, because she will then have become the commercial and financial centre, and the centre of population, no less than she now is the geographical centre, of this great

country. To this event, to be accomplished in the coming time, and at no distant period, the finger of destiny points with unerring precision. It needs no prophetic vision to see that the coming millions of population which are pouring into the Valley of the Mississippi, bearing with them their wealth of means and enterprise, will impart to this region and its great central city, opulence and power without a parallel.

It is well, too, that in the order of Providence this is so; for this vast extent of country called "the West" in the time of our Fathers, and now being the middle country, constituting the Valley of the Mississippi, must always be homogeneous in its interests, sentiments and social tastes to a degree not possible among either the Eastern or the Western States—and hence will be consolidated in this Valley a unity of sentiment among so many populous and powerful States, which will always enable those States and their people in the legitimate exercise of their political power, to hold in check the abberrations of the extremes, and with strength and dignity to counteract the centrifugal tendencies of the remoter parts and extreme regions, and to hold the whole country firmly and steadily in balance as one people united in one individual nationality.

On you, gentlemen of the Press in Missouri, is devolved the immense responsibility that public opinion in Missouri shall be so wisely shaped, that the people here shall in all respects be prepared to act their part in the great drama of the future, with glory to their State and benefit to their country—that at all times the people shall be prepared with firmness to maintain their own rights—to obey, respect and uphold the laws—and, above all, to inspire them with sentiments of political uprightness and national patriotism, which will become at once the guarantee and the prophecy of stability, prosperity, virtue and honor.

Gentlemen of the Press, before concluding, I will venture, with great diffidence (because I am of St. Louis), and briefly, to present for your consideration a few thoughts respecting the relations of the Metropolitan city to other parts of the State, and the influence of the Press on these relations.

It is not true that the growth of the interior cities, towns and rural districts of our State are as dependent upon the growth and prosperity of its great city, as that of the great city is dependent upon the growth and prosperity of the country? Look in whatever direction, you will find evidences that the country and its great city are mutually bound together in interest, and the true policy of each is to aid in the development and growth of the other. The influence of Chicago upon a large circuit of country, comprising a very considerable portion of Wisconsin, Illinois, Michigan and Indiana, in imparting activity and prosperity to those regions, is patent to all. Cincinnati and Louisville have given impetus to the growth and development of the extensive regions connected with them in business rela-

tions. New England owes her wonderful growth in wealth and industrial activity to Boston. While the little State of New Jersey, lying between two great cities, and though neither of them is within her borders, saturated, as it were, with the growth-impelling influences of both, is rapidly becoming the richest State in the nation in proportion to area; and that, too, notwithstanding her natural poverty and sterility, which is rapidly giving place to richness and fertility under the developing influences of New York and Philadelphia.

New York is undoubtedly the best illustration of this idea. Tell me where the boundaries of her influence to-day are marked out, and where its limits? That influence, radiating in every direction, covers the whole country and more or less impresses the value of every acre, and affects the growth of every town and city. The degree and extent of this influence are in proportion to the distance and facilities of access.

At the time of the organization of our National Government, as now constituted, Virginia surpassed New York in population and wealth. Her natural wealth of soil, of climate, and of mineral stores was, and even yet is greatly superior. But she had not the foresight to build a great city, and to transfer the seat of commerce for a continent from Manhattan Island to Hampton Roads, and make her Norfolk the commercial metropolis of the nation. The result is, that New York is, to-day, an Empire, by the power of her great city to control the finances of this country—a State rich in all the elements of greatness; abounding in prosperity, and teeming with a thrifty population; and this is due to the legitimate influence of her great metropolitan city, whose throbbing pulsations are felt in every farm, and village, and town throughout the Empire State. Virginia, in the meantime, neglecting to build up such great central power for the accumulation and distribution of wealth and enterprise, had receded from the exalted position of the first State in the Union in population, wealth and political influence, even before the war, to the position of about the seventh.

Now, gentlemen of the press in Missouri, this magnificent State of ours, planted by the hand of Providence in the midst of the richest and most extensive valley of the world, endowed with mineral and soil wealth and salubrity of climate beyond all her sisters, needs only to foster and build up her Metropolitan city to secure for herself the most commanding attitude in all this great belt of country stretching between the mountains from East to West, and from the headwaters of the Mississippi to the Gulf. The interests of those who represent the rural districts and the interior towns and cities are identical with the interests of those of us who represent St. Louis—your growth is bound up in our growth, and ours in yours—your prosperity is linked to ours, and ours to yours.

Let the press of the State then encourage the kindliest relations and sentiments between the city and country, well assured that every advance of one is a step forward for the the other.

BEE CULTURE.

BY T. R. ALLEN, OF ALLENTON, MO.

There was a time in the history of the world when honey was almost the only natural sweet available to man's use, and but for the honey bee, *this* could not have been. Bees do not *make* honey, as many foolishly suppose, any more than man makes the saccharine matter contained in the cane, fruits and many other things. Infinite Wisdom saw fit to distribute this delicious nectar we call honey into almost infinitesimal particles, and have it deposited in the delicate little cells and cups of multitudinous millions of flowers. In this condition, it seems to us that it would have been impossible that it should ever have become available to the use of man as a separate article of food. But the same beneficent wisdom that thus distributed this most delicious of all sweets, provided the little insect that we call the honey bee, with its industrious habits, delicate and wonderful instincts, to collect the same, and deposit it in the neat little cells built by herself, and as we say, furnishes her own materials and finds herself. She may, in one sense, be said to be a manufacturer, and the only one of the kind known; that is, of the peculiar kind of wax she uses for building purposes. She has been called a mathematician: she is certainly a most accurate and finished mechanic in her line. Her industry is probably not excelled by any of God's creatures. Her chief employment is the collecting and storing honey and propagating and perpetuating her species.

"How doth the little busy bee improve each shining hour,
And gather honey all the day from every opening flower,
How skillfully she builds her cell, how neat she spreads her wax,
And labors hard to store it well, with the sweet food she makes."

Although the labors of this useful insect have been utilized by man to a greater or lesser extent from the earliest periods of the world's history, yet little was known of its natural history until near

the close of the last century, when the great German naturalist, Huber, turned his attention to the study of its habits and instincts, which, up to that time, seems to have been involved in the deepest obscurity and superstition. The results of his investigations awakened an interest on the subject in different parts of Europe hitherto unknown. Men of learning and distinction turned their attention to it as a science, and as an important department in rural economy.

The first author on the subject in this country, of any distinction, was Mr. T. B. Miner, who published quite an elaborate treatise about 1849 or 1850. M. Quinby's "Mysteries of Bee Keeping Explained," appeared about 1853. This valuable work on the subject gave a new impulse to bee culture in this country to an extent previously unknown. It has passed through several editions, and is still a standard work on apiarian science.

"The Hive and Honey Bee," by L. L. Langstroth, appeared first, I believe about 1859, and has also passed through several editions, and is also a most valuable standard work. To this author we are also indebted for that most inestimable invention, the movable comb frames, making another great epoch in the science of bee culture. Many books by other authors have since been published, but they contain little or nothing new, but for the most part are the copyists of the ideas of the authors above mentioned. Mr. Langstroth's invention of the movable comb frames is undoubtedly the most important step in advance that has ever been taken in the science of apiculture.

The Italian, or Ligurian bee, was first introduced in this country in 1859 or 1860. This is not a different species, but a different variety of the same species as our native bees. It is, I believe, so far as they have yet been tried, universally agreed among bee-keepers, that they are very far superior, in very many respects, to our old native variety. The superiority claimed for them are about the following: Larger, more beautiful and hardy, more prolific, more industrious, swarm earlier and more frequently, less inclined to sting, less disposed to rob, more courageous and active in self-defense, longer lived, and what is most important of all, will gather twice as much honey; that they can gather honey where the natives cannot, and consequently can live where the natives would starve. I believe, myself, they are very far superior, but I cannot personally vouch for the truth of all the above claims. In the characteristic of docility, I have very serious doubts. I have found mine at times extremely irrascible and pugnacious. Though this is quite far from being always agreeable, I can hardly set it down as a grievous fault. As disagreeable as it certainly is, it is, in some respects, a quality rather to be admired than despised.

My practical experience in bee culture is by no means extensive; indeed, I claim to be nothing more than a novice in the science, but I am much in love with it, and am now giving it all possible attention and a good deal of thought, and so far, I cannot complain of my suc-

cess, or of my prospects. It is to me a most delightful pursuit, and I believe, with a proper knowledge of its requirements and proper attention, may be made profitable. It does seem to me strange, and a great pity, that so little attention is given to this pleasant department of rural economy. It has been estimated that, on an average, every acre will produce a pound of honey. Missouri contains 43,123,200 acres—equivalent, then, to that many pounds of honey annually; and how much of this vast amount is saved? Probably not one-tenth of one per cent. The balance is wasted on the "desert air." According to this estimate every square mile would support about six colonies of bees; a township of six miles square, or thirty-six square miles, would sustain two hundred and sixteen colonies; or St. Louis county would sustain three thousand eight hundred colonies; or the State of Missouri would sustain half a million colonies.

But this calculation is based on the average spontaneous production. Some districts will afford a great deal more, while others doubtless will afford less. But by a little attention to providing bee pasturage, or the cultivation of such crops as increase the honey product, and which are otherwise remunerative in themselves, we may greatly increase the product. According to our calculation the State of Missouri, as we have said, would sustain half a million colonies or families of bees. Now, allowing that each colony would, on an average, produce annually twenty-five pounds of surplus honey—which is certainly not an extravagant estimate—we should have, as a product of the State, twelve and one-half million pounds of honey, and this, at an average of twenty cents per pound, would amount to two and one-half millions of dollars annually.

But as this may seem somewhat impracticable, let us bring the estimates down to a scale that will be more personally interesting. We have seen that a township of six miles square would not be overstocked with two hundred and sixteen colonies, relying exclusively on natural resources, and this would give thirty-six families, six colonies each, and an average of twenty-five pounds surplus honey to the colony, would give each family one hundred and fifty pounds annually, or the luxury of three pounds of honey per week the year round. The whole investment would be a mere trifle. One or two colonies would be enough for a commencement. Say that you commence with one good colony of Italians, costing, with hive, $15; take from that, the first season, only one swarm. You want a hive for that—a good one, and you should not accept any other—would cost you $4. Here is your first year's investment, $19. Say you only get 25 pounds surplus honey from each, 50 pounds, worth at least 25 cents per pound, or $12 50. You may get double that amount; then $12 50 from $19 leaves $6 50, and for this sum you now have two good colonies of Italians, worth $30. The next year you may, if you choose, safely take two swarms from each of these, and you will want four more hives, costing $16. Now you have your complement, and your

investment is now $6 50 and $16 or $22 50. You ought to get, this year, at least 100 pounds surplus honey, which about squares the account, or a little balance in your favor. Now, you have your six colonies paid for, and they are now worth, say, at least $30, though you would hardly take twice that amount for them. Now, if 35 other families in your township of six miles square have done just as you have, and each have their six colonies, it probably would not be advisable for you to increase your stock much more, unless your township is above the average in the honey production naturally, or by artificially furnished bee pasture, in which case your increase must be governed accordingly. On the other hand, you may increase your stock, if you so desire, to just the number that the other 35 families lack of filling their quota, and as much further as the circumstances will justify. If none of the other 35 families keep any, you may take the whole 210, for it is said the Italians will go three miles to work if necessary, and this would cover the whole ground. The strong probability is that you can have all the territory you want for many years to come. You say the thing looks well on paper, but that you have no practical experience or any other kind on the subject, and know nothing of the *modus operandi*, to commence with. Then, if you have a taste for the pursuit, and are willing to learn, to read, and to think, and to give it the necessary attention for success, I advise you to procure, without delay, Mr. Langstroth's or Mr. Quinby's book, or, better, both of them, the latest editions, as standard works, read and study them well and thoroughly. Then subscribe for the *American Bee Journal*, published by Samuel Wagoner, Washington City, D. C. Read and study diligently this winter.

Next spring procure a good strong colony of bees in a good kind of hive, Langstroth's is the best of any of the patented ones. Continue to read and think, now in connection with observation and practice, and if you cannot in this way learn to manage them as your stock increases, be sure you have mistaken your calling, abandon it and seek something more congenial with your tastes. Do not expect to succeed by merely procuring a colony or two of bees and setting them down and paying no attention to them. If you do you will surely find you have made a mistake.

Although, as we have said, the bee "works for nothing and finds himself," if you would derive profit from them they must have attention. You don't expect to succeed in raising poultry, pigs, sheep, cattle and horses without attention? You must not only *feed* your horse, but it is your duty, and, I hope, your pleasure, to provide him a good, warm stable, and see that he is comfortable. But your horse will not work until you teach him how, and then he will not do it unless you go with him and compel him to it. He would eat oats and corn all his life long and never earn a pound of it unless you forced him to do it. He may do it very willingly with your presence and assistance, but without, be assured he will never earn his salt. But not so with

the honey bee: you have no need to teach her to work. She knows that by instinct better than you can teach her; you have no need to compel her to it; she is more industrious than you are; she will be in the field before you are out of bed. She needs a shelter for her stores, but is not so very particular about its looks or expensiveness, so that it is adapted to her purpose; and if you don't provide it for her, she will not grumble and pout, and get her back up about it, nor wait long on you either, but go and seek one for herself.

She is of very independent character, honest and virtuous; she demands no wages, not even her board; she simply propose a copartnership on business principles: you to furnish suitable shelter for stores, and, in case of necessity, assist her in defense against her enemies; she will gather that which would otherwise be lost, and you to have all, except what is absolutely necessary for her subsistence. If you don't like the terms, you need not accept; or, whenever you desire the copartnership can readily be dissolved without any sort of litigation or hard feelings towards you on her part, and she will go and do the best she can on her own hook.

But she stands upon her dignity, and it must not be expected that she can with impunity be *rudely* interfered with in her regular and systematic business operations. She is always ready to resist a real, or even imaginary insult, even at the risk or sacrifice of her life. But if you are respectful, dignified, and at the same time conciliatory in your manners and dealings, there will be no trouble. Under such circumstances, she will even allow herself to be shamefully imposed upon. You must be very careful not to excite her very irrascible temper.

Now, if I have induced some to read, and to *think*, on this interesting and important subject in the department of rural economy, my object is gained, if not my labor is lost.

BOTS. (*Œstrus equi.*)

[Translated from the French by Prof. Spencer Smith.]

A young agriculturist, de Saone et Loire, sent me, about the beginning of last season, a long complaint, which I may call the confessions of a disappointed stock-breeder. I have no authority for publishing this instructive letter, but as I shall omit the address no harm can be done:

"I shall confide to your discretion the edifying secret of my mistakes and simplicity; but to confess publicly, to openly avow my ignorance and credulity is beyond my courage. Leave unpublished, I pray you, the history of my bad failures and losses. I hope your good counsels will make me forget the former, and enable me to repair the latter.

I am not discouraged. At some future time, when I have had more experience, I may decide to make an open confession, which at present would be too much for my self-esteem.

Among the things which you have so obligingly spoken to me about, there is one which appears to me so strange that I would consider it a favor if you would make it the subject of an article in your journal. We should read it with interest. I wish to speak of what is usually called "bots," by which I have lately lost some of my young horses."

I shall answer, with pleasure, the inquiries of my young friend. His communication relates to the study of the development of the bot in the digestive organs of the horse.

The parasite is found in only one of the forms of the insect. In its perfect state it is like an ordinary fly. This is what probably so surprised the young breeder of Saone et Loire, but it is a well-known fact; besides the circumstance is nothing uncommon, and is well understood. In fact, very few insects preserve through life the same form as the one in which they are born. Metamorphosis is the general rule. In this case a fly lays its eggs, inclosing a larva, and this afterwards takes the form of a winged insect. This is the natural circle of insect life; and now let us try to follow it through its different stages.

There are many different species of bots. In its fecundity, nature has not been sparing. If I am not mistaken, every animal has a spe-

cies peculiar to itself. And this is not all, for the horse has at least two species. In the state of fly, their life is relatively short; it is much longer in the state of larva. This is true of insects generally. To give one example: that of the beetle which has so short a life as an insect and so long a life as a worm—the white grub. Between the perfect insect and the transformations which it undergoes, that great mistakes regarding its identity should be made is not remarkable. The different appellations that there are appear to be nothing in common. Frequently the true name is applied indifferently to the caterpillar and butterfly. At present we shall occupy ourselves only with the insect called BOT under all circumstances.

As a fly it is to be found in almost all countries; it may be known at a considerable distance. It is a torment during the warm season, whether in the prairie, in the shade, in the forests or by the highways —everywhere that animals feed or work. But they do not torment like most other insects, by tickling or stinging, or those that live on blood, which, after they have had their fill, fly away; but they simply touch the animal and away. They stop but an instant, but in that instant they deposit an egg in the most favorable place for its attaining the grand object of its existence—the reproduction of its species. Let us examine the two kinds which pursue horses, and especially colts, whose tender flesh and delicate organization are the bot's predestined prey, if we do not know how to preserve our stock from their persistent attacks.

The worst kind are those whose larvæ live only in the stomach or in that portion of the intestine lying close to it, called the duodenum. These have gauze wings, speckled with black in the center, the corselet is brownish yellow, as the sides, an orange yellow on its hinder parts, the under side of the belly is of a dirty grey. The whole body is covered with a cotton-like down, clouded like the parts which it covers. It has six feet, the hindermost being bifid. The head is like a large button supported by a small pedicle. The body is bent in a peculiar manner, like the letter C, the two ends being brought very near together. The posterior part of the body is very much elongated and carries a small brown sheath closely bent under the belly.

The other fly differs from this, and is distinguished by two well defined characteristics. Its gauzy wings are not spotted with black, and the posterior part of the body is blunt, obtuse, and of a beautiful orange color, flanked by two sharp hooks, which are the instruments by whose aid the insect pierces the membranes which serve as a receptacle for the eggs. This double ovapositor is wanting in the first kind, which lays its eggs on the surface of the body. If nature never makes anything which is not useful, neither does she dispense with anything which is necessary. This diversity of structure corresponds to the different habits and wants of the two insects. In the prairies and in the fields, around animals in whose bodies they wish to deposit their eggs, the two insects do not comport themselves alike. Those

which henceforth we shall call, in common with other naturalists, the horse bot (*oestrus equi*), and which would be better named the *oestrus gastrique*, prefers to fly usually towards the anterior parts of the body, especially the head and shoulders. They may also be seen attacking the flanks and other parts, especially the regions which the animal will be likely to reach with his teeth, or those which may be scratched by a comrade, the sides of the neck, for example. Flying about is not a matter of pleasure; it is a serious labor, during which the fly seeks a favorable point, and awaits a propitious occasion, then she stops for a moment and instantly deposits an egg, which is so firmly fixed, so strongly agglutinated that it is usually easier to pull out the hair than to detach the egg. The first egg being disposed of, is followed by others, till the supply is exhausted. Unless some accident happens to the mother fly, she is capable of laying seven or eight hundred eggs.

The work of the day commences as soon as the sun has warmed the air sufficiently to enable the insect to fly, and does not cease till stopped by the dews of evening. High-bred colts, of a nervous temperament, thin skin, and short hair are particularly annoyed by this fly. Frequently they run furiously about the pasture, in vain attempts to rid themselves of the pest. It is said that they have a sort of premonition of the dangers, but the faster they run the more persistent is the fly. It follows them wherever they go, and seems to become excited in the chase, and never quits them till it succeeds in depositing its eggs. The eggs are at first flat, oblate, and of yellowish grey color. Almost everybody has seen them fixed to the mane, and along the sides of the neck, the forelegs, especially the insides of the knees. They increase rapidly in size, and are soon filled with a whitish unctuous liquid. When first laid, it is very difficult to break them, but after a short time they burst with a slight explosion when crushed with the finger nail. In twenty-five days they hatch, and the larvæ, crawling about on the skin, cause a kind of itching, which induces the horse to commence licking and scratching, and even biting his skin. By this means the larvæ are introduced into the mouth, and from thence to the stomach. How admirable! The worm is born, but between the place of its birth and the interior of the viscera, where alone it can live and follow all the phases of its development, what a distance! Truly, an abyss! How many perils, what liability to destruction. The insect seems completely abandoned. Its safety lies entirely in the two hooks with which it is armed. It makes such good use of these that it is almost impossible to cause them to loose their hold, as feeble as it seems. The swallowing of the nits may be brought about in another way. Being detached in one way and another from the hair to which they have been fixed, they fall upon the grass of the prairie or upon the forage consumed in the stable, and arrive at their destination, together with the ball in which they are inclosed. Are not many of them lost by the way? Certainly, but

they are not the only lives trusted to the chances of nature. That but few arrive at maturity is fortunate, for if they all survived to hatch into the state of bots, no horse could sustain their insatiable attacks.

The first appearance of bots is in May and June, but numerous broods appear during the entire season, and never cease their operations, according to the instincts of their nature. Fortunately even the few which escape the thousand perils to which they are subjected are not assured of safety till they are introduced into the stomach, and there they are almost as liable to be thrown out as to stay. Unless they remain in the stomach the proper time, they never arrive to the state of true insect, and they do no damage to the animal which rejects them in the state in which he received them. Arrived in the stomach, the larvæ have still much to do. They must first disengage themselves from the other substances swallowed with them, and they must succeed in attaching themselves to some place from which they cannot be removed till maturity. The larva struggles hard, therefore, to fasten itself as soon as possible to the upper part of the stomach or the sac of the right side. Once there, it fixes itself firmly by means of the two hooks on the sides of the mouth. The place is well chosen. The membrane to which the larvæ are firmly hooked is thick and dense. It offers to the worm a firm hold and security from being torn away. The hooks hold well in thick membrane, and the suckers around the mouth place themselves ready for action. Ordinarily, when nothing troubles them, the bots remain quiet in their position, and live upon what they extract from the membrane to which they are attached. When disturbed they contract and plunged their heads deeper into the hole they have made. This gives them a firmer hold and enables the bot to contend successfully against all attacks upon it during its position in the stomach, and especially against the imaginary remedies of veterinary surgeons. Medicines administered in a solid form never reach high enough to touch them, and liquids do not rise above their level in the stomach, which is, of course, in proportion to their quantity. We may derive much advantage from this discovery. As has been already said, all the eggs laid do not become attached to the coats. Many fail, and are carried out of the system—the only place where they can do the least harm to the animal. Some, however, in going out of the stomach make a renewed effort in passing along the duodenum, fix themselves there and remain, but their existence is more disturbed, because the larvæ are smaller than those which have remained on the other side of the pylorus in the stomach.

But there is another explanation of this fact. It has been supposed that the bots remaining in the duodenum were the last introduced, and they took this place because there was no room for them elsewhere. I have not been able to verify the truth of this assertion, but I can truly say that I have never found an insect attached to the intestine, except when the left side was totally covered. I am in-

clined, therefore, to admit the truth of the assertion, but I must add that horses well fed and cared for, strong and active, the larvæ seldom stop on their way when once started out of the stomach. The membrane of the stomach, firm and tenacious repulses them, and they are not able to take a new hold.

This is not so with animals poor and feeble. On such the insect produces its greatest effect. The membranes are soft and easily penetrated, the animal not being able to defend itself against the attacks of the fly, easily yields itself a victim. Among such the bot abounds, they find the conditions favorable, and remain. This is the reason so many are found in poor and feeble animals, and so few in strong and healthy.

The larvæ of the bot remain ten or eleven months in the stomach, and all this time they maintain themselves by sucking secretions from the membrane to which they are attached. Some take their place in the stomach in the commencement of the season, from May to July; others arrive successively till October. The order of their introduction may be plainly seen by observing the more or less advanced state of the worms. When they have arrived at the proper age they detach themselves spontaneously, following the course of the digestive matter along the alimentary canal, and are evacuated with the excrements, to undergo thereafter their last metamorphosis. In the state in which they are voided, they are apodes, that is, without feet, of cylindrico-conical form, the body composed of eleven or twelve segments, bordered with tubercles, or spines. Once on the ground, they mingle with the dirt, remaining enveloped in it for some time; it would be difficult to say how long, because they never stir as long as the least noise is made near them. As soon as there is complete silence, they immediately commence moving very rapidly, making use of the rings of which the body is composed. They do not progress blindly, but the least noise or obstruction causes them to stop, and they remain perfectly immovable till they think it safe to proceed. When they fall upon the grass of the prairies, they descend to the ground, and begin immediately to dig their way into the earth, being aided by the hooks around the mouth. Finally, if they are voided while the animal is in the stable, they make the best of the situation, hiding themselves as soon as possible in some crevice in the floor, where they can remain in safety during their final change from pupa to fly. In this retreat, hard to find and difficult to get them out of without destroying them, they become torpid, and after a while change to pupæ. In this state they await their last change, which comes sooner or later, according to the state of the weather. The conditions most favorable to this change are not well understood. even during the finest season we may observe a difference of twenty-five days. When the proper moment arrives the pupa breaks the shell or sac which encloses it, and tearing open also its fine and silky envelope. It is a pupa no more, it has become a fly of the species

called by naturalists *œstrus equi*. It now lives merely for the purpose of reproduction. This accomplished, it dies. Its existence is limited to a few days. This, however, does not hinder our having these flies all the season, from the last of May to the last of October.

The succession of larvæ following the order in which they are introduced into the stomach is very rationally explained.

The first frost is fatal to the perfect insect. Struck with torpor by cold and humidity in the absence of the sun, even during the season of heat, they are sure to die by the first frost. This is assuredly very fortunate. Another remarkable fact, they will not remain in stables. If they enter with a horse they come out as soon as possible.

I have nothing more to say of the bot, but I am not yet done with the larva. I have something more to say of the effects of its presence in the stomach.

When the bots are only few in number, the animal suffers very little from their presence, and they pass without notice. But it is not so when the number is considerable; then they crowd all over the right side of the stomach, forming a continuous mass of hungry and voracious worms. Once fixed they do not wait long to begin their work of destruction, they satisfy their hunger at the expense of their host; he falls off and gets thin, while they grow fat; the poor animal grows poor and feeble, When the fat has disappeared the muscles shrink, the bones become discernable under their skin, the strength fails, and all the signs of weakness are apparent. Very little alarming in the beginning, the disease makes sure progress, and the more its effects are perceivable the stronger and more injurious these parasites become. There is a perfect coincidence between the conditions of the animal and insects. Thus, while one party is ruined the other is benefitted. It is a case of vigorous accountability, an example of forced loan. The parasites take without returning, and the host they treat as a conquered victim, who must yield to the law of the strongest, *væ victis*. They prey upon him, and sooner or later he must yield, for he cannot support the forced contribution, except by drawing upon his substance, to furnish the means. Every day the exactions become greater. The vampires draw harder upon his resources, and soon these are entirely exhausted. The animal eats as much as ever, but the appetite is not regular. It can no longer repair the want occassioned by the enemy. Thus disappear gradually all signs and all advantages of health. His coat turns brown and rough. He becomes gaunt, and frequently opening his mouth, moves his jaws from side to side, the consequence of muscular contraction of the jaws; the eyes are dull and the sight is dim; the pupil is very much dilated. Sometimes a remarkable scintilation of the eye may be observed strangely in contrast with the languor which becomes the habitual state of the animal.

Every function shows that the condition of the animal is abnormal. The sick animal (I write this in the presence of one) stamps

frequently with his foot, thereby fatiguing himself when complete rest is required; he also frequently raises his head and stretches out his neck. He cannot, like us, put his hand upon the seat of pain, but he frequently turns his head to the left and gazes long and steadily at his flank. When he lies down it is frequently upon this side, then he extends himself at full length, and rolling partly on his back bends his head towards his body. The tail even has an expression. It is often raised and bent towards the left side. Unequivocal signs of the pain the animal suffers in the bowels are frequent. He rises and stamps furiously about sometimes, so as to strike his body with his hind feet, but generally the agitation is not so great as when afflicted with acute colic. He feels pain, but it appears to be a kind of dull heavy pain. At intervals there is a slight cough, which seems to come from low down, and is called stomachic. This is a very characteristic symptom. At this stage of the disease the limbs become bloated. This dropsical appearance contrasts plainly with the emaciation of the body elsewhere, and shows the impoverishment of the body and the general derangement of the whole machine.

To such results do the operations of the gastric bot lead. As formidable as it appears, this attack amounts to nothing against strong and vigorous animals capable of defending themselves. With them the resistance is so effectual that the evil passes off without any serious consequences. But with the poor and feeble, predisposed to attack, the enemy meets with scarcely any resistance. Under such circumstances the case becomes quickly alarming, and if not met by prompt measures, the subject soon succumbs. The regimen must be abundant, tonic in its character, and substantial. At the same time the proper remedies must be perseveringly applied. Only in such cases have vermifuges the slightest chance of success. They are useless as regards the few bots which can live in the stomach of healthy and vigorous horses. The bots remain there without causing any uneasiness to the horses. Having explained the condition of things, let us see what should be the practice most injurious to the insect and most beneficial to the animal suffering from their attack. I have said that the place they occupy and their peculiar position in the stomach insures them against the effects of any medicine either solid or liquid. On the first appearance of danger they hide their heads in the membrane of the stomach, and cling to it with terrible tenacity. Thus, contracted and curled up, their respiratory and digestive organs are safe against the effects of medicine. They do not try to get away, instinct teaches them that their safety depends upon their remaining and retaining their hold.

Such is the insect we have to contend with. We may remark that their construction is such that it renders them more refractory to the effects of poison than any other entozoa. This being the case, the first efforts must be directed towards lulling the vigilance of the larvæ and rendering quiet and torpid, thereby depriving them of the

will and strength to continue their depredations. In accordance with these principles we have composed the following remedy: The formula may vary, but the articles composing it seem to be those most successful. The dose is made for animals eighteen to twenty months old: mucilaginous decoction of marsh mallow or flax seed, 15 oz; empyseumatic oil, one table spoonful; sulphuric ether, one tea spoonful. Shake the mixture and administer it cold in the morning before feeding. Give the same the next morning, then stop three or four mornings in order that the gastric irritation which is caused by the empyseumatic oil, which is here the poisonous agent, may subside. The rapid volitization of the ether in the stomach, produces intoxication of the larvæ and deprives them of the power of contraction which has been before spoken of, and which is their greatest protection against the effects of medicine. These preparations are not entirely innocent, and their effects should be observed by a person of experience.

Chasing away the fly or covering the coat with offensive oil or other liquid, crushing the larvæ when they escape naturally from the body produce only meagre results. The best effects are produced by careful grooming, and cleaning the limbs from all nits, once or twice a day. Altogether the best preservative and the only effectual one is a generous diet, substantial, and tonic, which enables the animal to resist the attacks of every insect. Besides watch carefully your horses and endeavor to detect, at the earliest possible moment, any symptoms of disease.

Horses which have died of bots show scars on the stomach, which may give some idea of what have been their sufferings. There can almost always be found in the sacs of the stomach and in the duodenum, even the greater part of the larvæ which have had their abode there. They are there in great numbers and of different sizes, according to the times when they located themselves in different stages of development. A large majority, however, are of large size averaging about an inch in length. The thirteen or fourteen rings of the body are armed with triangular and flat spines. The skin is hard, hairy and tough, of a reddish appearance not only on the outside, but through its entire thickness. The two hooks at the side of the mouth are so deeply implanted, and so firmly attached to the head of the larvæ, that it is easier to tear off the head than to loose the hold. When they are carefully removed, we may perceive a little round ulcer which looks as if made with a punch. Each larva having worked on his own account, the stomach is completely riddled. By observing closely, many places in the stomach may be found hard, thick and horny throughout. The other viscera connected with the stomach, the pancreas, the liver and spleen are relapsed, tumefied and filled with yellow abnormal concretion.

The rectum is covered with larvæ, but these are of a different species, and have no connection with the death of the horse. They

are born where they are found, of eggs laid on the exterior of the rectum by a fly called *Oestre Hemorrhoidal*, but would be better called *Oestre Anal*. I spoke of this insect in the commencement of this article. Contrary to the action of the other species of bot, it frequents only the posterior parts of the body of the horse, it flies about the thighs and croup. As soon as the anus is opened to let pass the fecal matter, it approaches, and, making an incision with its double dart, lays an egg in each hole. Attacking parts which are not very sensitive, the oestre anal causes very little pain. The eggs hatch in from thirty-five to fifty-five days. The larva is neither so large nor so long, and less than that of the stomach. It has only eleven or twelve rings, and its hooks are like fishhooks, long and sharp, and so firmly fixed that they are rarely detached.

Were I not fearful of making this article too long, I would explain the physiological difference between the larva and fly of the oestre gastrique, and the larva and fly of the oestre anal, but this would be a matter of little consequence to the breeder of horses. Le' oestre anal, besides, does not injure the horse, and his destruction is a matter of small consequence.

I stop here, believing that I have said all that is of practical utility or of especial interest.

ENG. GAZOT,

Member of the Imperial and Central Society of Agriculture of France.

BREEDS OF SWINE.

Prepared for the Farmers' Convention at Edwardsville, Illinois, by Chas. W. Murtfeldt.

Webster defines swine thus: "A hog; a pachydermatous mammal of the genus *Sus*, which furnishes man with a large portion of his most nourishing food. The fat, or lard of this animal enters into various dishes of cookery. The swine is a heavy, stupid animal, and delights to wallow in the mire."

Mr. President and Gentlemen: Swine are not considered as noble animals, as horses or cattle; neither have they the disposition or patience of the sheep. Hence they have never in one sense of the word drawn upon the sympathy of man. Man, commonly, does not

choose a swine for a pet or companion, as he does the horse or the dog, though a hog can be taught to be both, as may sometimes be witnessed in the cabins of the Irish peasantry in Ireland.

PEDIGREE.

If we go back to the "Godolphin Arabian," brought from France into England in 1724, it is less than a hundred and fifty years since any attempt was made to keep the pedigree of horses. It is even less time since a like record has been kept of cattle. The earliest date I have been able to trace is about 1791. Of course it is still a less time since the same has been attempted with sheep or swine.

A BREED.

Just what time is required to fix a certain type or establish a breed of any animal is still an open question with the best of judges. Our authorities differ. Management, feed, climate, all have their influence upon animal life. Even the human family is affected by these. For instance, in the South we have the dark skin, brown or black eyes, and other striking characteristics, while in the North we find yellow, auburn, or brown hair, grey or blue eyes, and a fair complexion as the general features. The inhabitants of Finland, living to the north of Sweden and Denmark, form a striking exception, having dark hair, eyes, and complexion. But, Mr. President, it has been made my task on this occasion to speak on Breeds of Swine. Without putting too fine a point on it, a breed may be considered as fixed or established whenever the peculiar excellencies of the parents are very generally transmitted to the offspring without deterioration, or as it is termed, "breeding back."

It is the experience of every careful breeder, corroborated by my own, that it is very difficult in swine *to blend* the peculiar excellencies of the sire and the dam in the offspring. This, if I understand the matter, must be owing, in part at least, to the number of pigs in each litter, some following the sire, others the dam. Very striking examples, illustrating this point, are to be found in the dog. In animals which generally bring forth but one young, as the horse or cow, it is not quite so difficult. Again, in the last-named animal it generally requires a full year or more to produce one young (no reference to the time of gestation), while during the same time, with care and attention, two and even three litters of pigs may be produced from the same pair. Allowing only two litters as the standard for our purpose, the constant breeding of the same excellent parents, or their superior *get*, would in fifteen or twenty years so fix their type as to be recognised as a *breed*, while in the other two examples given, thirty or forty years would be necessary to accomplish the same practical result. In a conversation recently had with Prof. Miles, of Michigan Agricultural College, upon this point, he expressed substantially the same opinion as to swine. Crossing of an improved breed, with a good model of a common hog (not a *hazel-splitter*, nor *sunfish*, nor

landshark), crossing two distinct breeds for the purpose of blending the excellencies of each in the product, has been the labor of a life time with many of our best farmers. Those breeds of swine now known and recognized as fixed, are the result of the process I have attempted to describe, and not of accident, as some men are likely to conclude, aided by climatic and other influences already hinted at.

It is the remark of a writer that "those animals which are most essential to the comfort of man have been most widely diffused by a kind Providence. Among these animals we certainly rank swine. They are to be found in all latitudes between the frozen regions on the north and south." Asia may, perhaps, be the home of swine. At any rate, mention is made of them in the early history of our race. (See Bible, Lev. ii, 4.) They were classed with the unclean animals, and the Jews were forbidden to eat the flesh.

In Piedmont and Italy the color of the hog is generally black. In China, both white and black. In Normandy, the color is white. Sometimes both colors are blended. It is asserted that in Hungary and Sweden swine are found with solid hoofs, though in other countries they are universally cloven-footed.

The best authority accessible to me asserts that all swine are the offspring of the wild hog, which is yet found in many sections of France and Germany. His general color is a foxy or reddish brown. He is not as large as our best popular breeds, very seldom attaining to a weight of three hundred pounds; is less gluttonous also, living chiefly on vegetables. He is not dangerous, except when attacked, and then the means of defense are the tusks, often ten inches long, which have been known to do fearful execution, even against human skill and valor. Hunters and epicures esteem his flesh as more delicate than that of the domesticated animal, though when we consider the fact that the wild swine are never gelded, one would suppose that the flesh was naturally less palatable.

The enormous increase of one pair of swine under domestication will be apparent from the fact that in six years, at an annual increase of fourteen, they will number 119,169, while one pair of sheep with increase for the same time, will number only sixty-four. I wish to refer here to a physiological fact, which may not be generally known, namely: A hog's inside, the location and division of the vitals, heart, lungs (lights), liver, diaphram, large and small intestines, resemble more nearly that of the human body than those of any other animal, except, perhaps, the orang-outang. In a country like ours, and among a self-reliant people, who are accustomed *to help themselves*, it not unfrequently happens that the farmer has to turn butcher, consequently most of my hearers have in all probability acted either as masters or assistants at the annual hog slaughtering. Such will remember how nearly the above statement is true.

With these cursory remarks as introductory, Mr. Chairman and gentlemen, let us consider some of the breeds of swine, called im-

The Chester White Boar "VICTOR," the property of Paschall Morris, editor of *Practical Farmer*, Philadelphia.

proved, now claiming the attention of the farmer and stock breeder, and foremost among these I unhesitatingly class the

CHESTER WHITES. (See illustration.)

They are not an original but a "make up" breed, being a cross between the best native stock of Chester county, Pennsylvania, and an imported Bedfordshire boar. This animal was imported more than forty years ago, by Capt. James Jeffries, his stock is well distributed over the country. The present type may be described in its desirable points, as follows: good length and depth of carcass, breadth of back, small bone, very small head in comparison with the size of carcass, full round ham, shoulders full and well pushed towards the head, leaving little or no neck, heavy jowl, dished face, thin skin, straight hair and straight back. They are my model of a hog, can be made to attain any desirable weight, and have the fat and lean in the right place.

Farmers who breed for weight estimate a gain of one pound per day until they are two years old, and they very often exceed this; some have attained a weight of 900 lbs. Hogs of from five to eight hundred pounds are very common. As an instance I have copied the following from the *Country Gentleman:*

VERMONT SWINE.

"I observe that Mr, W. F. Baggerly, of Savannah, New York, wishes to get the largest hog in his own State. We Vermonters are out of the way, but I will take the liberty to let you know what we have up here. B. H. Paine, of Lowell, killed a hog that was twenty months and two days old, and that he had fed twenty months and no longer, which weighed eight hundred and fifty and one-half pounds (850½) four hours after killing, and was growing as fast and eating as well as any hog ever grew, till the day of his death, and probably would have grown and done as well for three months more, as any hog ever did in the United States. The hog was a "White Chester," and good judges think that by taking a little pains and feeding so as to stimulate muscle, he could have been made to weigh fifteen hundred (1,500) pounds." N.

THE "MAGIE"

Often successfully disputes first rank with the *Chester Whites.* Never having bred the *Magie*, or seen them in perfection, I wrote to the originator of the breed and received the following courteous and satisfactory reply:

OXFORD, OHIO, January 12th, 1870.

CHARLES W. MURTFELDT, ESQ.,

Corresponding Sec. Missouri State Board of Agriculture:

DEAR SIR: Your favor of the 6th inst., has been received, and should have been answered sooner, but my business relations has been such as to deprive me of the pleasure of complying with your request before this. Fully appreciating the compliment paid me and

the importance of you receiving this previous to your departure for Edwardsville, Ill., I hasten to reply in answer to your questions:

1. The original breeds of my stock of hogs were Poland, Big Irish Grazier, Big Spotted China and Byfield. Three of which were imported.

2. The time occupied in perfecting the Magie hogs, or if you wish, obtaining their present style and qualities, I am not prepared to answer definitely—though I assure you it required *considerable time* and *attention*.

3. The excellencies I claim for the Magie hogs, viz: They are of fine bone but large size, combining more eminently than any other the excellencies of both large and small breeds, being docile, very good breeders and sucklers, fattening readily at any age, and yet attaining great weight at maturity.

They sometimes *dress* 350 pounds at from ten to twelve months old; from eighteen to twenty months old, 500 to 600 pounds; at full growth I have had them to dress 800 to 936 pounds.

The Magie hogs have long bodies, short legs, broad, straight backs, deep sides, with square heavy hams and shoulders, drooping ears, and are of fine style generally.

Mr. M. further says regarding the

IRISH GRAZIER.

This is a breed, which, in its purity or originality, is not, to my knowledge, bred or existing in this country at the present time, but is one of the crosses of a great many of the hogs of this country, and, as shown above, is one of the breeds used in producing the "Magie" breed of hogs. They (the Irish Grazier) are white, with long round bodies, rather long limbs, with ears that are *not* inclined to droop. Of the "Woburn," which, according to a letter received from George M. Bedford, Esq., of Paris, Kentucky, are identical with the

BEDFORD

Hogs, Mr. Magie is pleased to say: I have seen them, but as I never admired the stock, have paid but little attention to them, consequently am not prepared to express an opinion.

According to Mr. Bedford, Woburn is a small town in the shire (county) of Bedford, England, from which the breed was imported into Kentucky by Samuel D. Martin, M. D., somewhere about the year 1838 or 1839. The importer claimed that they were the best hog for the farmer, fattening rapidly, and attaining great size. But the farmers failed to see the point in the light of the Dr., and they (the Bedfords) have disappeared entirely. Mr. Bedford thinks the Irish Grazier were introduced about the same time, by James E. Lettin, of Bourbon county, Kentucky, from Ireland. They were a good hog, but when crossed with the Berkshire, were greatly improved, giving them more constitution, maturing earlier, and having less disposition to mange. Mr. B. does not like the *Chester Whites*,

thinks they are too coarse, and have to be kept entirely too long to be profitable. When we have considered the

BERKSHIRE

And pointed out their peculiar excellencies, we will better understand *why* Mr. B. considers them the best breed (as he says he does).

If the farmer wants a hog that will *shirk* for six months in the year, this is "the chap." He is pretty leggy for his size, a good traveler and grazier, has a good round ham, a fair shoulder, which accounts for his easy locomotion, but fails on the inside and broadside, when lard is the point. What I mean is this: that he will not "open" as well on slaughtering, as he promises when he is alive. His ribs spring out from his back, and he looks heavier than he is. And in familiar Illinois parlance: "this reminds me of a story," which furnishes a case in point.

Near the mouth of the Kishwakee, Winnebago county, Illinois, lived a fine old gentleman, whom I had the honor to know, and with whose premises I have been familiar. We will call him *Brown* for good and sufficient reasons. Mr. Brown was well posted as regards this characteristic point of the Berkshires. He bred them in their purity for years, and sold many a pair at six weeks old, for twenty-five dollars. The year of our story was about 1846 or 1847. At that time corn would not bear transportation for any considerable distance. It would only bring $2 75 or $3 00 per hundred in the concentrated shape of good pork, and many a wagon load went into Chicago from Rock river, at even less figures.

That fall Mr. B. had a drove of perhaps 150 head of Berkshire swine. Galena, having its lead mines in full operation at that time, furnished a good market, and a point for packing. A drover from this place visited Mr. B. with a view to buy his hogs, but they could not come to terms, except on the actual weight of the hogs. Finally, it was agreed that an average hog should be selected and weighed, and the drove paid for at so much per 100 lbs average.

During his stay at Mr. B's., the drover had taken a great fancy to a pair of pigs, which he wished to possess for breeders, and which Mr. B. valued at $25 00. The drove was started for Rockford, the average hog was there to be weighed, and the whole drove settled for according to agreement. When about half way there, the drover and his men were overtaken by a messenger from Mr. B., with word, that if the drover would accept his (B's.) estimated weight, that the much coveted pigs should be made a present to him. The bait was eagerly swallowed, the offer accepted, and as a final result, the drover became a wiser if not a richer man. A pair of Berkshire pigs, at most valued (not worth) at twenty-five dollars, cost him two or three hundred.

The color of the Berkshire is black, with a white stripe in the face and white feet; small white spots on the neck or body are not unfre-

quent. By good care and feeding they can be made to weigh between four and five hundred pounds at twenty months old.

THE "MORGAN COUNTY WHITES"

are an Illinois breed, pefected at the Hospital for the Insane, at Jacksonville. They have been known as the "*Hospital Breed*," and are a very desirable hog. Their color is white, they are well haired, lengthy, deep in carcass, quiet in disposition, good feeders, hence fatten easy. The foundation breed is evidently the Suffolk. They attain good size, but are not quite equal to the *Chester County Whites of Pennsylvania* in this respect. They are now considered A BREED, and from what I have seen of them at many of the Illinois and Missouri fairs, I am inclined to regard them with great favor, and do not hesitate to recommend them to my farmer friends.

[NOTE.—Having written this, I afterwards received the following interesting letter from Dr. McFarland, which I give as corroborative, and worthy of implicit credence and confidence.]

ILLINOIS STATE HOSPITAL FOR THE INSANE,
Jacksonville, Jan. 19th, 1870.

MY DEAR SIR:—I embrace the first leisure opportunity to respond to your letter of recent date, requesting information as to the breed of swine now generally known to be peculiar to this institution.

I premise by saying, that an Insane Asylum possesses extraordinary advantages for the rearing and care of domestic animals, swine more especially. From the table of the patients, will always necessarily be carried much broken food, of a nutritious quality, which, in more regulated households, would be served a second time in another form; but which, for obvious reasons, must find its way directly into the swill-car, after receiving the kind of usage that rejected food does at the hands of the insane. The convenience of steam, always at hand, gives the best facility for re-cooking all such food, with its combination with such other ingredients as may be found desirable. The same facility also brings heated water directly into the pens of the animals, affording the luxury of a wash at the most inclement season of the year.

There are also, among the inmates of such an institution more or less of permanently resident incurable subjects, with just that degree of sanity that makes them excellent curators of dumb animals, for it is a fact that the insane man, when his line of duty does not absolutely run against the grain of his disease, often makes the most faithful of all care-takers. Again, it is a maxim at this institution that a pretty bad fellow, whether sane or insane, can make a very passable Christian of himself by exercising according to the best of his "inner light," the Christian graces upon the brute creation; and swine we consider excellent subjects for practice, because, in making any ascent it is always best to start from a level! Hence our swine, through good food, cleanliness at all seasons of the year, and, beyond all,

living under the ægis of a broad philanthropy, have a pretty good chance to make the most of their natural gifts.

Fully possessed with a knowledge of these advantages, I commenced in good earnest, nearly fifteeen years ago, to *compose* a new breed of swine. As there has been a weak jealously in some quarters toward recognizing our swine as a distinct breed, I would beg to put the question, What makes a breed, either of men or animals, but certain distinct features of form and color, peculiar to a certain line of descent? When these features are established, the breed exists, beyond the dictum of any man. Any one who conclusively establishes form and feature by breeding continuously, has the undoubted right to claim and name his breed.

The breed of swine already on the ground at the time referred to, were fancifully styled "Irish Graziers," from rather a dim tradition that a hog bearing that name was the first animal of the species introduced upon the place. They were of generous size, something of the rail-splitter type, of undoubted constitution or they could not have withstood their total want of systematic care, and, on the whole, perhaps as good a primitive stock as could have been chosen on which to engraft choicer blood.

The first essay at improvement was made with the Suffolks. This proved only a partial experiment, as the boar introduced died after only a limited use. It is probable, however, that even this small infusion of new blood had its ultimate effect on the breed as now existing. At a period a little later, the Chester White was resorted to, that breed being then the best approach to the model sought after. To this deservedly celebrated breed of swine, I would award all the credit it has received from the agricultural public. Yet, with all the encomiums I am disposed to extend, it did not come up to our ideal, in all respects, of what a perfect hog should be to command the entire favor of pork-packers. It was variable in blood-points—different specimens from the same litter often totally dissimilar in form, as if of different blood; it was frequently coarse, and with too great superabundance of bone to be a favorite at the slaughter house.

In the year 1857, among the importations made by the Illinois Stock Importing Association, were some swine of the breed known as the "Windsors," so termed from Prince Albert's Model Farm, where they are said to have their origin. One of these animals was purchased for the use of the institution; and from this cross the especial peculiarities of our stock are derived. Size, symmetry, delicacy of flesh, docility, and early maturity, are what we claim as their distinguishing characteristics. These several traits belonging to the "hog of the period," we have sedulously cultivated, by the most strict attention to the points of every animal allowed to become a breeder.

I have thus communicated all that is of material importance in in regard to our swine. The whole is contained in the single idea of

breeding, with a distinct and long established purpose in view. How far that purpose has been attained the swine themselves must testify. If success has attended the effort to produce a breed meeting the requirements of the agricultral community, it is due in a great degree to the unusual facilities afforded here for ascertaining the popular idea of a good breed, and the means alluded to in the first part of this communication for carrying out a well defined purpose.

Yours, very respectfully,

AND. McFARLAND, *Supt., &c.*

CHAS. W. MURTFELDT, *Cor. Sec'y. State Board of Agriculture.*

THE ESSEX

Take their name from a county in England. They are classed with the "*small breeds.*" Their color is black, but is only confined to the epidermis, for when well dressed, they will be as white as any of the white breeds. They are hardy, of quiet disposition, good feeders, and can be made to weigh four or five hundred pounds at twenty months old. They are preferred, because they can be made to weigh three hundred pounds at twelve months old, and farther, they, like the Suffolks, are always ready for the knife, but unlike the breed just mentioned, are not subject to the mange.

THE SUFFOLK

Is also an English breed, but originally of China extraction. They are thin haired, in color white, small boned, small eaters for their size, very quiet disposition, disinclined to travel and of all the breeds emphatically "*the poor man's swine.*" A real door yard pig. They will keep in good condition on the offal from the table and dairy, and need but little corn to make them ready for the knife. When lard is the object, this breed yields more than any other according to their gross weight. As some have it, "*it is all fat.*" This breed is somewhat liable to the mange, unless the improved breed can be obtained, which are well haired, and which were perfected by Prince Albert consort to the Queen of England, and kept on his model farm at Windsor. They are sometimes named after him or the place. As far as I know, there is but one establishment in Illinois where pure improved Suffolks are now bred, and I know of none in Missouri. Of course, they are classed with the small breeds.

THE YORKSHIRE

Very much resemble the Suffolks as regards the thin white hair and the consequent exposure to the mange. They are, however, much larger, perhaps the largest of all the English breeds. Their flesh is coarse in fibre, they have large bones and require a greater age to come to maturity. Simon Ruble, Esq., of Beloit, Wis., has bred them to some extent. In a reply to a letter of mine he makes these same objections, and says "they cost too much; corn fed to the Suffolks and Berkshire, which are my favorite breeds, pays better. Mr. Ruble,

likes the "Berkshires," because they are more prolific than the *Suffolks*, and better nurses; and, I think, the point is well taken.

The very large premium ($800), offered by the St. Louis Agricultural and Mechanical Association, or rather by the Pork Packers of St. Louis, through the above named association, FOR THE BEST HOG (boar) FOR PACKING PURPOSES, has brought out some extraordinary hogs. Among the competitors for the premium were most so-called large breeds, but the victor was a mixed breed named

POLAND AND CHINA.

This hog was black with white spots irregularly all over the body, of very large bone, as it must be to carry a weight of 800 pounds or more. I should judge the fibre of the flesh to be coarse, but otherwise the general appearance of the hog was good. Ham rounding and full, and very deep sides, in fact, a hog which must "cut up" well On the other hand, a hog requiring age (nearly or quite two years) before maturing, and I should judge, also, not well adapted to early dressing.

There, doubtless, are other breeds besides those enumerated, but I am inclined that those *prominently and favorably* before the public have been delineated, and their dominant characteristics given, truthfully, as to the best authorities accessible, and my own personal experience.

Having devoted this much time to the consideration of "*Breeds*," a few hints as to the most economical way to rear and fatten swine will not be considered out of place. On a place where but a few swine are fattened, and where these are bought at the age from two to four or six months old, they are undoubtedly best kept in a sty until ready for the knife. *Farmers*, however, are not given to this sort of thing, unless they are constitutionally opposed to pork. Western farmers generally "*go in*" largely.

Commencing at the beginning, let us consider the best time to have the pigs dropped. Breeding sows should be kept in a small pasture, so that they can exercise; confinement, while conducive to fattening, is adverse to a full and perfect development of the pigs, as well as to the healthy farrowing of the sow. Large hogs of the opposite sex, gelded or entire, should not be kept in the same inclosure, neither should very small pigs; the first will keep the sows too uneasy, and the second are often overlaid, lamed or killed by heavy sows.

As already stated, if any considerable number of swine are kept on the same farm, the sows should not farrow until the weather is warm, and the season so far advanced that very cold storms are not anticipated and need not be guarded against—say sometime in March or about the first of April. The pigs should be able to draw all the needed sustenance from the dam, or in other words, the sow should be so fed prior to and during first four or six weeks succeeding the

farrowing, with milk, house slops and offal mixed with bran or other millfeed and roots, as to afford plenty of milk for her young, and not shrink materially herself in flesh during the suckling of the pigs.

After this time she and the pigs should have, in addition, good clover pasture; the pigs should be taught (if necessary) to drink milk, and weaned altogether in two weeks thereafter, or when about eight weeks old. From my own experience of many years, from personal observation and from intercourse with practical farmers, I recommend *mill feed*, viz: bran, shorts, corn meal and the sweepings of the mill, mixed with skimmed or loppered milk and kitchen slops, as much better for young pigs, than corn meal alone in any shape; the latter is too *rich*, or too *strong*, if that is the better term.

Professor Miles, of Michigan Agricultural College (to try an experiment) undertook to feed four Suffolk pigs, when only two days old, entirely on cornmeal; he said they did not do well, their hides cracked, and an oily substance seemed to ooze out all over their entire surface, he ordered them put out of the trial pen and given a more appropriate diet.

As the result of such feeding as I have recommended, allow me to state that I have known late harvest pigs to be made to weigh 180 to 200 pounds by New Years. They had, however, in addition, the gleaning of the wheat fields, but no corn or meal, except, perhaps, for two or three weeks, just prior to their being killed, and during this time they were kept in a close sty.

A fellow townsman of mine adopted the following plan, with which he and all that knew of it were very much pleased: He prepared a field of clover of fifteen acres; one of the same size he sowed to oats, and one of like extent he planted with corn. The fields all joined and were crossed by a brook of clear running water. The fence (a movable one) inclosed the clover. When the clover was of sufficient height, the hogs, near one hundred and fifty, and from four to six months old, good thrifty shoats were put upon the pasture until the oats were ready for them, when nearly ripe, then the fence was moved so as to inclose the oat field, and the swine set to harvesting. It is due to the hogs to say that once in possession of a field, with no one to molest or make them afraid, they do not pull down more grain than they will eat up clean. After the oats were all consumed, the fence was again shifted so as to inclose the corn field, which was in turn harvested. After this they were fed in a close pen on corn in the ear. I have the word of the owner, that had he only received three cents per pound gross, it would have paid him well. His receipts were largely in excess, however, just how much I do not now remember. This experiment was made prior to the war.

CORN VS. HOGS.

Again, two keen and hard working farmers had a strife for some years as to which made the most money. The first, Mr. N., never sold

a kernel of corn in the market, but fed it, on his place, to swine principally. Mr. W., on the contrary, preferred to market most of his corn. One year with another there was no great difference as to the actual receipts in dollars and cents. Mr. W., however, had much the *most* labor and much *less* benefit from manures, though he was, in all respects, a very good farmer and made good use of what manure he did have. I am inclined to think that his farm deteriorated under the constant cropping, while Mr. N.'s farm is now really in better tilth.

One more example. Mr. C. is one of the best farmers I ever knew, measured by the standard of intelligence, or by the result of his farm operation in dollars and cents. His lands are rather thin, naturally, but being sandy they are warm and quick. Corn is his great crop, and most of his fields are planted to this staple every year. Although being within two and one-half miles to a good market, I never knew him, during a period of fifteen years, to sell corn, except in the shape of pork, or, to a very small extent, beef. He has, perhaps, thirty acres of June grass and hazel-brush pasture, with here or there a burr or other oak tree; in this he keeps his stock, including hogs. Until August, the hogs receive, in addition, the kitchen and dairy slops, with a little mill feed or soaked corn. If acorns and nuts are plenty, they run to the pasture until the most of these are consumed; otherwise, they are shut up in a large yard, in which are also the straw piles of the same year's crop of small grain; these afford shelter and bedding. When the hogs are first confined to this yard, they receive plenty of salt, and ever after during the entire fattening process; they have free access to all the salt, sulphur and charcoal they will eat, and all the drink they desire. At first, the corn is fed to them, stalk and all, but after a little while the corn only, as much as they will eat up clean, and always at regular intervals. In about six weeks after the corn is first fed, most of the swine will be so fat as to refuse to rise and eat. I have often said and sometimes written, that he is the best, most careful and most judicious feeder I ever knew, because he can put on to his hogs the most flesh and fat in the least time.

Mr. C., in common with the other gentlemen referred to, were all partial to the *small breeds* of swine, of which I have attempted to give a brief outline. The observations noticed are not of a single season, but for a number of years, and they have furnished the examples which in my own farming I have followed with some success.

COMBING AND DELAINE WOOLS.

BY A. P. MILLS, WARREN COUNTY, MO.

C. W. MURTFELDT:

DEAR SIR:—Agreeable to your request, I herewith give you a few of my ideas as to the growing of combing and delaine wools in Missouri.

These wools have been and are now being grown in Kentucky with good success, and as we have in Missouri a similar climate, I can see no reason why they cannot be grown here profitably. It is always best for farmers to raise and produce that article of which there is not a supply equal to the demand. In growing fine wools we have to compete with South America and Australia, where they can raise wools, at a profit, at eight (8) cents per pound. While in combing wools we have England and Canada as our greatest competitors, and we can produce them at a much less cost than they can, and English and French manufacturers want all the wools of this description produced in their respective countries.

The question may be asked: will we not overstock the market with these wools? My answer is *No*. The shoe manufacturers of Lynn, Mass., have offered a capital of $300,000 to any energetic company who would start the machinery for making lastings for uppers to ladies' and children's shoes, and they would agree to take their goods to the amount of $1,500,000 per annum; but, for the want of the combing wools, they could get no one to engage in it; and this is the only one branch of the trade in which these wools are used. There is now used of these wools, in the United States, over 12,000,000 pounds annually, and our manufacturers have to depend on Canada for a great part of this amount. In my opinion the best breed of sheep for growing the combing wools are the Cotswold and Leicester. The latter are preferred by some of our best manufacturers, and I think they are the most hardy and healthy of the two varieties named.

I have seen flocks in Michigan that would average eight pounds of wool per head. They are good breeders, almost always having twins, one flock of twenty-eight ewes last year raised forty-eight lambs. As a mutton sheep they are far superior to fine wool or native sheep and they are better feeders. It is not uncommon to find Leicesters at four years old that will weigh from 300 to 400 pounds, live weight. I had on exhibition, at the Michigan State Fair of 1869, a three year old buck that weighed 350 pounds, and a four year old that weighed 400 pounds.

They make a fine cross with fine wools or native sheep, increasing the size of the animal and making a good delaine wool or a number two combing at the first cross. It is not uncommon for the half bloods to dress, at two years old 100 pounds of meat, and the meat is of a much finer quality than any fine wool or native mutton. With as good a mutton market as we have in St. Louis, the raising of sheep for that purpose must prove profitable to the farmers of Missouri. The question will no doubt be asked, what is the profit of growing wool at the present low price? My answer is this: During the war, the government was such a large consumer of woolen goods that many of our manufactories of cotton were converted into woolen mills (as there was a scarcity of cotton), thus giving us double the number of woolen spindles at the close of the war to the number in operation or existence in 1860, which, together with the large amount of woolen goods the government sold at the close of the war, flooded the markets from east to west and from north to south. This depression of the woolen interests cannot last long, and now is the time for our western and southwestern farmers to get started in wool raising. The best time to buy any article of merchandise is just when everybody wants to sell. Compare the cost of sheep now with five years ago. Then Michigan, Ohio, and other wool-growing States could sell their culls at from five to seven dollars a head. Now good, young and healthy fine wool sheep can be furnished, landed in Missouri, at a cost of from three to four dollars per head.

Fine wool sheep, I find, flourish well in this climate. We have a flock, brought from Michigan last fall, as well as a flock of Leicesters that we imported from Canada; both flocks are doing finely; with proper shelter from storms, they would need no feeding during the winter, if rye was sown among corn, after the corn was made, with perhaps the exception of a few oats each day. Leicesters should have turnips or mangel wurtzel to grow a strong staple of combing wool. All kinds of sheep need tar and salt, where they can eat as often as they are inclined. It keeps them healthy, and gives the wool a soft, silky texture.

I would not advise the buying largely of long wool sheep, for this reason: a farmer can buy the fine wools much cheaper, and by buying a few long wools (Cotswold or Leicesters) and breeding them on to

fine wool sheep, he can soon make a flock of nice combing wool and mutton sheep.

Much more could be said in favor of sheep husbandry in Missouri, such as the abundant grass, the little feed that it takes to fatten a sheep, compared with any other animal, the constant enriching of the soil, etc., etc., but I fear I have wearied you already.

COOKING FOOD FOR STOCK.

BY A. E. TRABUE, HANNIBAL, MO.

Owing to the scarcity and high price of corn, its most economical use and that of other cereals in fattening and wintering our stock for the past few months has been an important consideration. For a number of years I have seen numerous articles in the newspapers, going to show that there is more economy in cooking the feed, for hogs in particular, than feeding it in any other way.

I have been at considerable pains investigating this particular point, and the testimony of all who have published their opinions and experiments, point invariably to this result, that it is better to cook. Thomas J. Edge, of Chester county, Pennsylvania, says, when corn is worth $1 a bushel and pork ten cents a pound, he found five bushels of shelled whole corn made 47¼ pounds pork; then, by my count, his pork would thus cost him 10¾ cents. He found five bushels, less miller's toll, ground and made into a thick slop with cold water, made 54½ pounds, equal to a cost of 9 1-13 cents per pound. The same quantity of meal, well boiled and fed cold, made 83½ pounds pork, equal to a cost for pork of 6 1-40 cents per pound.

He found the following also, that ten bushels of ears of new corn nubbins, worth 50 cents a bushel, thrown on the ground to them, made 29½ pounds, — 17 cents per pound for the pork made.

The same quantity, ground, shelled and boiled, made 64 pounds, — 7 5-16 cents per pound.

Agricola, in the *Practical Farmer*, December, 1868, says:

"Five bushels of boiled meal (old corn) makes 84 pounds pork, —to 16 5-6 pounds pork to the bushel. Three bushels of meal boiled

and five of small unsalable potatoes made 72½ pounds. Thus we find one bushel of boiled potatoes make 4 2-5 pounds."

His experiments proved also the following: That five bushels of new corn (shelled out of ten bushels of ears) ground and boiled, made 60½ pounds pork, = 15 pounds per bushel; ten bushels of new ears of corn, ground cob and all and boiled, made 71 pounds. A bushel of ground cobs then makes 10½ pounds of meat.

He thinks it pays to grind the cobs up to the 1st of January; not later.

He finds the increase of bulk is the true measure of value.

Millers will give a bushel of meal (by measure) for a bushel of shelled corn.

Fermenting increases this bulk 25 or 30 per cent. Boiling will double it, and makes it, therefore, 100 per cent better, and is, therefore about 75 per cent better than fermenting it.

Another experimenter, October, 1869, finds when corn is worth $1 bushel, boiled or steamed potatoes are worth 50 cents a bushel for fattening hogs, and new potatoes worth 25 cents a bushel, not more.

Ten years ago Sam. Clay, of Bourbon county, Ky., found raw corn made 5½ pounds pork, boiled corn, 10 pounds, and boiled meal 17½ pounds to the bushel of corn.

Professor Mapes, of New Jersey, found the contrast between cooked and raw still greater; Cassius Clay, of Ky., ditto, and that it paid to cook for cattle.

I have not seen anywhere anything opposed to these results. It would appear, therefore, to be demonstrated that the farmer that insists on feeding raw corn to hogs, had better throw one-half in the river and cook the other half, even if he had to get an extra hired girl for the business, and spread a new table cloth for every meal and wash the dishes afterwards.

Impressed with this fact, I procured a good steamer at the last St. Louis fair, and returning home put three Chester White pigs in one pen, three ditto in another, and two ditto, with a half-breed sow pig in the other. This last was out of a sow from Chester county, Pa., by a Berkshire boar from Bourbon county, Ky. This last not altered; all the rest are altered, and nearly all out of sows direct from Chester county, Pa.

All these pens were under the same shed, side by side, open on the East and South sides only.

The meal fed was old corn, ground, and exactly the same as that that was used in the family. It weighed 46 pounds to the bushel.

The whole corn fed was all new corn; 68 pounds of ears shelled out a level bushel of shelled corn, which then weighed from 52 to 55 pounds, depending on the advance of the season.

The hogs were bedded with straw at first, then dry leaves from the forest, then with good timothy hay, all alike.

The meal was cooked by stirring a bushel of meal into a half barrel of boiling water, and the compound then boiled an hour by steam;

a full handful of salt was also added. The corn shelled, and put into enough cold water to cover it and immediately boiled 4 or 5 hours.

The raw corn was thrown to them on the ground, dry.

Pens in size, 5 feet by 16 feet.

PEN NO. 1.

	Oct. 18.	Nov. 10.	
Half-breed Berkshire and Chester White sow, weighed	110	110½	Eat 3 bushels boiled new corn in ear and gained 27½ lb.
Chester White barrow, "	64	78½	
" " "	63	75½	
Total	237	264½	

PEN NO. 2.

Chester White sow weighed	64	79½	Eat 3½ bushels of boiled meal and gained 35½ lbs.
" " barrow weighed	56	71	
" " " "	58½	63½	
Total	178½	213½	

PEN NO. 3.

Chester White sow weighed	62	81	Eat 3½ bushels of raw new corn and gained 50½ lbs.
" " barrow weighed	53	72½	
" " " "	73½	84½	
Total	188½	238½	

It will be remembered the weather was very severe from the 18th to the 25th of October; thermometer at one time, 16° Fahrenheit.

Those fed on boiled corn fell off one-half a pound, those fed on boiled meal fell off 2½ pounds, and those on raw corn gained 1 pound in seven days during this severe October weather.

November 10th they weighed as above. I then changed the feed all around—those before on boiled corn now get boiled meal, &c., made the mush much thicker now, so as to take it out on a spade.

FROM NOVEMBER 10TH TO 26TH.

Pen No. 1....	Sow, 113 Barrow, 81 Barrow, 84½ Total..278½	Eat 2 bushels of boiled meal and gained 14½ lbs. Mean temperature for the sixteen days, 28° Fahrenheit, at 6 A. M.	
Pen No. 2....	Sow, 85½ Barrow, 81½ Barrow, 81½ 235	Eat 2 3-8 bushels of raw corn and gained 21½ lbs.	
Pen No. 3....	Sow, 87½ Barrow, 73½ Barrow, 81 242½	Eat 10 bushel of boiled corn and gained 4 lbs.	

Raw corn beat the other two again. Could not understand this. Concluded the cooked stuff should not be salted. Also shelled the corn and soaked it twenty-four hours before boiling. Also soaked half the meal the same time. It seemed almost impossible to boil the soaked meal. The steam would escape through the part nearest the steam-pipe, but would not diffuse itself through and cook the whole. Changed again. Boiled meal pigs (Pen No. 1) now get raw corn.

Gave each pen salt and ashes in a small box, and water in separate troughs.

DECEMBER 3D.

First pen.....	Sow,	116½	Mean temperature since last weight, 34°. Eat 1 7-10 bushels of dry corn in six days and gained 12⅝ lbs.
	1st Barrow,	86	
	2d Barrow,	89	
		291½	
Second pen....	Sow,	88½	Eat one bushel of boiled corn and in six days gained 4⅝ lbs.
	1st Barrow,	80⅜	
	2d Barrow,	70⅜	
		239⅛	
Third pen.....	Sow,	95½	Eat 1½ bushels of boiled meal in six days and gained 27 lbs.
	1st Barrow,	82	
	2d Barrow	92½	
		269½	

Concluded I had found the trouble, and that the cooked feed should not be salted—also wrote the inventor of the steamer and agents to see if I was using it right—got answer that I was. The rubber pipe having burnt out, had to cook for the following experiment in a common wash kettle. Part of the mush burnt to the bottom in spite of all the stirring I could give it.

DECEMBER 8TH.

First pen.....	Sow,	121	Mean temperature since last weighing 29°. Eat one bushel of raw corn in five days, and gained 14⅜ lbs.
	First Barrow,	91½	
	Second Barrow,	94	
		306½	
Second pen....	Sow,	94	Eat one bushel of boiled corn in five days, and gained 14½ lbs.
	First Barrow,	86	
	Second Barrow,	74	
		254	
Third pen.....	Sow,	94	Eat one bushel of boiled meal in five days, and lost ten and a half lbs.
	First Barrow,	79	
	Second Barrow,	86	
		259	

It will be seen the same pigs got the same food this time as before, and the weather and temperature nearly the same—but the result is very different. After maturely considering the matter, I concluded the favorable result of December 3d was due to the fact, that the meal was only partly cooked, and that in fact I had been cooking too much. The spirit, strength and substance was in great measure boiled and evaporated and lost. The cooked mess could be smelt fifty feet away. Reasoning thus, the mess for the following experiment was as cooked as follows: the corn soaked 24 hours in cold water, then steamed; as soon as the water boiled, the barrel containing it, was immediately covered tight, so as to confine the heat, aroma, etc., for 12 hours. The meal was stirred into boiling water, and then as soon as it boiled again, it also was blanketed with weights, etc. on, like the corn with following result, pigs are not changed but get the same feed.

DECEMBER 13TH.

First pen.....	Sow, weighed	127½	Mean temperature since last weighing 42° Fahrenheit. Eat 5-6 of a bushel of raw corn in five days, and gained 16 lbs.
	1st Barrow, "	95¾	
	2d Barrow, "	99	
		322¼	
Second pen...	Sow, weighed	98½	Eat three-fourths of a bushel of boiled corn in five days, and gained 14 lbs.
	1st Barrow,	88¾	
	2d Barrow,	80½	
		268	
Third pen.....	Sow,	97	Eat one bushel of boiled meal in five days, and gained 12¾ lbs.
	1st Barrow,	83¾	
	2d Barrow,	91	
		271¾	

It became manifest now, that a good breed of pigs could do their own cooking and grinding, better than I could do it for them. During the whole of this time I had been feeding our stock hogs cooked wheat, that being more abundant with me than corn. Nearly all of my neighbors had also been feeding cooked or raw wheat.

I now began to fear it was bad policy to cook wheat also. Accordingly I fed the same shoats cooked and raw wheat, and raw corn meal with the following result:

DECEMBER 20TH.

First pen.....	Sow, weighed	121½	Mean temperature for seven days 22°. Fahrenheit. Eat one bushel of cooked wheat, and lost ten lbs.
	1st Barrow,	96	
	2d Barrow,	95¼	
		312¼	
Second pen...	Sow, weighed	97½	Eat one bushel of raw wheat, and lost six lbs.
	1st Barrow,	88¾	
	2d Barrow,	76	
		262	
Third pen.....	Sow, weighed	101¾	Eat 1⅛ bushels of raw corn meal, and gained 8¾ lbs.
	1st Barrow,	86	
	2d Barrow,	92	
		279¾	

It now appeared that myself and neighbors had been acting a very simple part in feeding wheat whether cooked or raw.

I had a considerable quantity of surprise oats on hand, weighing 46 pounds to the bushel, concluded to compare that with dry corn and corn meal, with the following result:

DECEMBER 28TH.

First pen.....	Sow, weighed	126¾	Mean temperature of past eight days 24°. Fahrenheit. Eat half bushel of raw wheat and 27-46 of a bushel of surprise oats in eight days and gained 15½ lbs.
	1st Barrow,	95½	
	2d Barrow,	105½	
		327¾	
Second pen...	Sow, weighed	101	Eat 51-68 of a bushel of dry corn in eight days, and gained 21½ lbs,
	1st Barrow,	97½	
	2d Barrow,	85	
		283½	

Third pen.....	Sow,	weighed 106½	Eat two bushels of raw dry corn meal in eight days, and gained 20½ lbs.
	1st Barrow,	90½	
	2d Barrow,	103½	
		300½	

It would almost appear from this that dry surprise oats was almost as good or better than corn. I now tried that directly with this result—the corn being changed to the other pen, etc:

JANUARY 5TH, 1870.

Second pen...	Sow,	weighed 119½	Mean temperature for past eight days 25°. Fahrenheit. Eat two bushels of dry raw corn in eight days, and gained 33½ lbs.
	1st Barrow,	106½	
	2d Barrow,	91½	
	Total.....	317½	
Third pen.....	Sow,	weighed 111½	Eat two bushels (66 lbs.) of raw dry surprise oats in eight days, and gained 16½ lbs.
	1st Barrow,	97	
	2d Barrow,	108½	
		317½	

There is one other way to feed stock hogs that is supposed to give good results, and that is to feed cattle through the winter, and let two or three hogs follow each head of cattle. One cattle feeder of this county found that one full fed steer would feed three hogs through the winter.

Having a very thrifty scrub cow that I wished to fatten for beef, I put her, December 29th, in a half acre lot. She had free access to a shed at all times. This shed was tight on all sides except the east, and this sheltered also by a rise in the ground, and other buildings. The three pigs from pen No. 1 (above) were put in the same lot, and had access to the same shed and water. The cow was fed in a trough out of reach of the hogs, all the corn in the shuck she would eat. She ate 45 pounds of this a day, equal to a half bushel of shelled corn. Weighed December 29th, 1,070 pounds; January 8th, she weighed 1,022½ pounds, having fallen off in ten days 47½ pounds; the shoats gained three pounds a day—thirty pounds. Mean temperature at daylight for the ten days 21½°. Fahrenheit. She was then turned out during the day, and allowed access to a cornfield and a little blue grass, and at night and morning was fed as before, all the corn she could eat. On the 15th of January, she weighed 1,050 pounds; gained at liberty in one week 27½ pounds—about four pounds a day. Mean temperature at daylight 30° Fahrenheit. Counting in the shoats, this would make not less than fourteen pounds of beef and pork to the bushel of corn. She did not eat as much corn as before, but the stalks and grass were an equivalent, and proved better management. At the same time with this thrifty seven year old native cow, I weighed a thorough-bred short horn two year old heifer. The latter weighed 1,187½ pounds. She was not fed at all, but was allowed to range in a corn-stalk field, in which there was some grass and hazle brush. Inasmuch, as my forty head of cattle had been running in this twenty acre stalk-field some weeks. I take it for granted, there was but little fodder and no nubbins of corn left.

That this short horn heifer lost no weight, under these circumstances, I consider a decided proof of the superiority of these lords of the horned world—the Durhams.

While closing this article, the *Practical Farmer* comes to hand, giving the experiments of a Pennsylvania Farmer, who fed young hogs raw old corn, raw green corn and boiled meal, from middle of August to middle of October, the feed and hogs not being changed; all fed at the same time, and all of the same litter of pigs. He found boiled meal gave an increase of 18 1-5 pounds to the bushel, raw old corn 18 4-5 pounds, and green or soft new corn 20 pounds to the bushel. Temperature not given, but Central Pennsylvania, for the last seven years, I find, gives a mean of 60° Fahr.

Now it is not possible to doubt the honesty and integrity of former experimenters on the hogs, and therefore these last, right in the teeth of those heretofore given, drives us irresistibly to this conclusion:

1st. That the breed of hogs has been improved. That we have now one breed, if not more, that can extract every particle of nutriment from raw corn; that can do their own shucking, shelling, taking to mill, grinding, packing back, steaming and boiling, much better than we can do it for them.

2d. That the best temperature to fatten hogs is from 42° to 60°, which is usually found from the last of August to the middle of October.

3d. That they should have shelter, or access to it.

4th. If the fall is dry they should be turned into the field to help themselves before the corn hardens, and after it is out of the milk.

5th. All there is in corn is 18 to 20 pounds of pork to the bushel, and if fed to an immature pure bred hog, cooking does not help it.

In conclusion, I suggest this theory:

Nothing should ever be fed to an animal in a moist state, for the animal, whether horse, cow or hog, is thereby tempted and enabled to swallow its food unmasticated. The more we can induce an animal to chew its food, the better and more intimately it is imbrued with saliva, and the more easily digested. That learned fossil, Prof. Agassiz, at a discussion of the Boston Agricultural Society last month, asserted that all food fed to animals should be ground and moistened, because we thereby save saliva, "For whence" says he, "comes saliva?—It comes from the blood." Well, suppose it does. When it has performed its office it goes right back to the blood again. It requires two gallons of gastric juice to digest a pound of raw meat or its equivalent. This juice is immediately reabsorbed, and is not lost. So of the pancreatic, biliary, etc. Each of these have their offices in assimilating certain portions of all food that is eaten.

The most recent experiments go to show that the action of the gastric juice is confined to nitrogenized substances, and that it exerts no influence on starchy, saccharine or oily matters. Starch is ac-

upon by the salivary fluid, sugar is dissolved, and oily substances are reduced by it to a state of fine division without the agency of the gastric juice.

Now an acre, 30 bushels of shelled corn, contains 270 pounds of husk or woody fibre, 900 pounds of starch, sugar, etc., 216 pounds of gluten, etc., 90 to 170 pounds of oil or fat, and 27 pounds of saline matter. Other grains, as well as bright, well cured hay, are nearly in the same proportion. It will then be seen that the saliva is of the very last importance, and we had better save anything else rather than that. The gastric juice of the stomach is altogether of secondary importance.

Considering these undeniable facts, we would naturally conclude that the more we could induce our domestic animals to chew their food, and imbrue it with their saliva, the more good it will do them; and accordingly the careful farmer will find this view abundantly supported by the experiments above given.

I am now speaking of the improved breeds. It may or may not pay to cook for others. There is undoubtedly a great deal in the breed. Last year, in a fattening pen of thirty hogs, I put a pure bred Chester White barrow; the heaviest of the former weighed something over 350 pounds at killing time; the Chester White, on the same corn, weighed 737½ pounds—a gain of two to one.

I have tried the Poland-China alongside the Chester Whites. They seem full as thrifty.

The above experiments were with immature pigs a few months of age. I have since carefully fed, in like circumstances, two Chester White sows, from eighteen months to two years old, weighing 271½ and 343½ pounds, with this result:

When fed boiled meal, they gained 13½ pounds to the bushel, when weighed twelve hours after they ate it.

When fed raw dry corn, they gained 19½ pounds to the bushel. Hogs weighed twenty hours after they eat it, and allowed no water meantime.

When fed meal that was first soaked in cold water and boiled, they gained 20½ pounds to the bushel. Hogs weighed twelve hours after eating.

When fed raw corn soaked in cold water, they gained 41½ pounds to the bushel. Hogs weighed nine hours after eating it.

Best result—The two hogs gained five pounds a day on boiled meal and fourteen pounds a day on soaked raw corn.

This, in one respect, conflicts with my theory that everything should be fed dry.

MODEL PIGGERY.

In this connection, I think it ofimportance to give an illustration and outline of a "Model Piggery" which was originally published in the *Practical Farmer*, edited by Paschall Morris, Esq., of Philadelphia.

"The plan of the piggery delineated in the accompanying engraving is susceptible of reduction or extension, for a larger or smaller number of pigs, and is intended to superscede the not only useless, but objectionable as well as expensive, mode of constructing large buildings under one roof, where confined and impure air, as well as the difficulty of keeping clean, interfere greatly with both health and thrift. Twenty-five or thirty breeding sows, farrowing at different periods of the year, can be accommodated under this system of separate pens, by bringing them successively within the enclosure; or an equal number of hogs can be fattened without any crowding or interference with each other. Some two years ago I sold a very fine

pair of Chester County pigs to a customer (not a farmer,) who complained that at the end of twelve months they only weighed 175 pounds each. On inquiry as to his management, I found they had been kept in a horse stable, which was cleaned regularly once a month! It was dark and badly ventilated, and the pigs were entirely out of reach of sun and pure air. The tenacity of life shown by the White Chesters, under such circumstances, spoke well for the breed. Thrift and growth were of course impracticable. Neither the White Chester, nor any other breed with which we are acquainted, will do well in confined or close quarters; and where too many are kept in a single pen, the heat of contact is very apt to create mange.

The nature of a hog, no less than the composition of his food, indicates a large amount of animal heat; and we have always noticed that they suffer much more from heat and confinement than from cold. This fact is kept in view in the above arrangement. The entrance, as seen in the engraving, is on the north side of the building, which therefore fronts the south, as does also each separate pen. The main building is thirty-two feet long by twelve wide, with an entrance gate at each lower corner to the yard of two first divisions. The entry or room in the centre is eight feet wide, allowing space for slop barrel, feed chest, charcoal barrel, (almost as indispensable as feed chest,) hatchway for access to root cellar underneath the whole building, and also passage way to second story. The latter is used for storing corn in winter and curing some varieties of seeds in summer. A wooden spout, with sliding valve, conveys feed to the chest below. The grain is hoisted to the second floor by a pulley and tackle on the outside, as observed in the engraving.

The perspective of main building allows a partial view of platforms, surmounted by a board roof, and divisions in the rear. The ground plan allows six of these on either side of the passage way. The first two pens, to the right and left of the door, are 12 by 12 each, and attached to them are 25 feet in length of yard by 15 feet wide. All the yards are extended three feet wider than the building, which admits of the two entrance gates at the corners.

Another division then commences, consisting of a raised platform, 6 to 8 feet wide, and extending the same width as the first pen, with a board roof over it, and also boarded up on the back, which answers the purpose of a division fence to separate from the pen behind. Twenty-five feet of yard are also attached to this, and the same arrangement is continued to all the six divisions.

We have this board roof and wooden floor on the north side of each pen, and fronting the south, to be ample protection in cold, wet, or stormy weather. The floor is kept perfectly clean, and even the feeding trough is not on it, on account of more or less of wet and dirt always contiguous to the trough, which freezes in winter and becomes slippery.

Each yard is used for the deposit of refuse vegetables and weeds,

litter, etc., thrown in from time to time, to be consumed or converted into manure. This is conveniently loaded into a cart passing along on the outside of each range of pens.

The passage way between each range of pens gives convenient access to the feeder, for all the divisions. A door also communicates from one division to the other, to make changes when necessary, and also a door or gate from each pen to the outside, so that one or more can be removed and others introduced without any confusion or interference from any of the other pens. The two pens under the main roof of the building, being more sheltered, are reserved for sows who many happen to farrow very early in the season, or in extreme cold weather, which is always avoided if practicable.

For several reasons, the boiler for cooking food is in rough shed adjacent to the piggery and entirely outside of it. There is no reason why this should be necessarily a part of the piggery.

The above plan is not offered as embracing much that is novel in arrangement, but as one that combines many advantages,—

1st. Complete separation, as well as easy communication between each pen, as well as to outside from each.

2d. Avoiding close and confined air, and admitting of extension or alteration for a large or small number of pigs.

3d. Facilities for keeping clean and receiving refuse vegetables and weeds, etc., for conversion into manure, and also for loading from each pen into a cart passing along outside.

4th. Cheapness. With the exception of the main building, all the rest can easily be erected by an intelligent farm hand."

FARMERS' CLUBS.

INTRODUCTORY BY C. W. M.

There is perhaps, among men, no more encouraging feature than the universally acknowledged axiom, that "Knowledge is power," and the practical turn given to this pursuit of knowledge and information, in seeking that which appertains to the profession of the farmer or to his life work. *Farmers' Clubs* are springing up in every intelligent neighborhood, and these cannot but result in good to every active member.

There are in every community leading men, who, by force of character, by careful study and observation, and most of all by hard labor,

have worked out the problem of life to worldly success (that they are often godly, christian men also is an undisputed fact, and a very encouraging feature). Such are seldom *talking men* merely, but when in debate are always ready to assign a reason for the faith that is in them. They are rarely so niggardly and recreant to social duty as to be unwilling to see their neighbors achieve like success with themselves; and if they, by giving counsel and information, backed up by example, can aid their fellows, they are glad to have the chance. Being modest men, they need sometimes to be urged forward, but once seeing matters in the light of duty, they will generally respond. The readers are advised to look around them, and give honor to whom honor is due.

Per contra. Talking theorizers, who unfortunately are often blessed with "*the gift of gab*," are hardly ever wanting in a community; they are ever ready to ventilate their windy rhetoric, and often occupy the time of "Farmers' Clubs," or "Conventions," or even of our Legislatures. But being unable to point to their own success, a little skill on the part of presiding officers, or a few direct and pertinent questions from the *solid* members, will generally suffice to put them in their proper light and place.

Viewed from a practical, intellectual and social standpoint, how much better such meetings and discussions, than those of so-called debating societies, whose general topics are confined to impropable political questions and issues, or perchance to historic events, which cannot be correctly decided, for the want of proper authorities, and either side of which can be carried by the impudent assertion, well stuck to, of any of those windy talkers which debating societies are so apt to develop. Of course no reference is had to literary societies in connection with institutions of learning.

It is a most happy feature then that Farmers' Clubs are being established in many communities. Socially its value is beyond computation. Practically it furnished a great fund of information. But, says one, how can we make it available? Are not all its benefits local? Suppose they are, if every county, or town, or school district, has its club, does it not benefit and elevate the entire farming population? But there is no need to rest here. Let but the secretary of the club be a practical man, able to "*boil down*" the remarks of the speakers and furnish a corrected copy to the editor of his county paper, (and by the way every well conducted county paper should have an agricultural column or two,) and the writer will hazard the opinion that said editor will be *eager* to publish the proceedings. It will not only enhance the value of his paper, but as a necessary result will increase his subscription list. Every man cannot attend every meeting, but he will wish to know what has been said or done, or very likely wish to preserve a complete record of all the proceedings of his club. Again, if anything meritorious or valuable has been brought to light, if any old and accepted *theory* has been overthrown,

or any maxim confirmed by experiment, we say, if such things are published, every well conducted exchange journal will copy the article, and this adds to the general stock of information.

The old homesteads of the Eastern and Middle States, loved, revered and cherished though they be, have yet many younger sons to send out. The few acres of eastern farms will bear no further subdivisions, and why should they? In our day, when railroads and telegraphs annihilate distance, when a man can travel a thousand miles quicker and with greater ease to himself than he could travel a hundred but a few decades past, he is, to all intents and purposes, as near to rooftree and kindred as he would be though he reside but in a neighboring county.

UNCLE SAM'S farm on the contrary is a very large one—it will bear subdivisions; he has a homestead for each of his boys, whether sons or nephews, or adopted children, and while the old rooftree above referred to cannot shelter all that first saw light beneath its sheltering rafters, the folds of the Star Spangled Banner of Uncle Sam are so ample as to protect all his numerous family, wherever they may dwell; and just here we cannot forbear to point to the grandest and sublimest beauty of our NATIONAL FEDERAL UNION.

A citizen of the United States is also by virtue of that right a citizen of any State where he may please to make his abode; in Maine or California, on the tide-washed banks of the Hudson or "where rolls the Oregon," and Uncle Sam says he may have a farm if he wishes.

Now, it is true that some men can and do go from the hearth of affection and intelligence to dwell in a wilderness, solitary and alone, the foe and slayer of beaver and martin, the mink, wolf and bear. Not many such men are found, just enough to form the exception to the rule, that man is a social being.

A well read farmer, a social, loving, affectionate man, who admires and seeks as well as repects the company and association of like minded men and women, will not be likely to make a new home in a neighborhood of illiterate, uncouth, idle, unthrifty, unsocial and, as a sequence, vicious men. He will prefer to settle in a community where he sees evidences of thrift and intelligence, where he beholds well cultivated fields, tidy buildings, neatly kept fence corners, well fed herds and flocks, and last though not least, well planned schoolhouses, peopled with tidy, rosy-cheeked little folks, all eager to master the books with which their satchels are stored; where the sound of the church bells is heard, inviting to the worship of the All-Father, and, if you please, where social meetings and Farmers' Clubs are not wanting.

Therefore, we say, it is a most encouraging sign of the times, that farmers are establishing clubs in which to discuss the best time and manner of performing the various and multifarious labors of the farm and the workshop; that this is being done in our own State, and

that by these discussions each add to the general stock of knowledge, peculiarly adapted to our own State, and to our own people. Looking at this subject from a low standard only, (and we by no means undervalue the higher one of intelligence, good morals and Christian benevolence), namely: that of dollars, we can readily see how the value of every acre of land in the State is augmented, how it invites immigration and contributes to the rapid development of internal improvements, and in no small degree aids to make Missouri what she is destined to be at once, the broadest, most beautiful, and at no distant day, the *Empire State* of the Union the most brilliant in all the *Constellation.*

Among the most active of the *new* clubs we cannot omit to mention the one started in St. Louis within the year 1869. This sprang from the people *full grown.* Some of its members hesitate not to ride twelve miles in their buggies to meet with their fellows, while others come thirty or forty miles by rail, to enjoy the same privilege. Its members are always courteous, but so keen and scrutinizing, and of such practical turn of mind, that very little of nonsense has been perpetrated. The writer is well aware that through some inadvertance and mistakes, errors have been published, calculated to mislead, but these have been promptly corrected by the club, and even with these, the official proceedings, as reported by the Secretary, will compare very favorable with the proceedings or transactions of any similar organization in the United States. Other clubs might be mentioned, but we forbear. With these remarks, we beg the privilege to introduce the records of Farmers' Clubs of an early and a more modern day.

FARMERS' CLUBS.

BY GEORGE T. WALTON, WENTZVILLE, MO.

"Two heads are better than one," is as old as the "Common Law," against which the memory of man runneth not to the contrary. Who believes this to be a practical truth?

Every "city," East or West, by river or railroad, in "running order" or prospective, has its board of trade; every church has its synod, conference, class, or other stated meeting; every political, social or scientific department has its meetings or consultations. The minister, lawyer, doctor, teacher, mechanic, sailor, boatsman, insurance men, bankers, transporters, railroad men, artists, in short,

every trade, art, profession, believe, act upon it, have their "trades unions," "institutes," "clubs" or "societies;" associated under some name for mutual assistance, instruction, protection and advantage, the adhesive power of which is, that "in union there is strength"—in much council there is wisdom. Are farmers wiser than those? Is their profession so very easy to master that *they* need no such help? Is there less social feeling in them than others? Are they afraid that the secrets of their trade will be obtained by others and themselves damaged thereby? Does no farmer in the vicinity know better how to plant, or sow, or cultivate his crops than you do, that you might learn from him? Or is there nothing that you can learn? Then, why not form associations for mutual information, profit, and protection? Every non-producer in the land—and they are legion—from the eloquent divine through all the trades and professions to the lowest quack or shyster lawyer, must obtain their "daily bread" through your toil. They feel that the duty of "skinning you" is the first one on the list, and each other next. You are the great "objective point" of each and every one of them, collectively and individually. Let them eat each other as they may, you foot the final bill. Can you, therefore, afford to fight them singly. If not, associate together, gain all the experience of others you can, give all you can, and by giving you will be enriched.

I have met with many different farmers' clubs or kindred associations, whose object was the mutual information and assistance of the membership and promotion of agricultural knowledge in the community, and believe, with a very intelligent writer, that "civilization in every land is only in a true ratio with agriculture." I am not surprised to find that wherever the best organized and conducted agricultural societies are located, there is the best society—in a word, civilization is in due proportion to agricultural knowledge.

In this article, intending to be brief as possible, I propose to notice a few of the leading plans for farmers' clubs.

1. The Kentucky, or more properly speaking, perhaps, the English plan, where the farmers meet at the monthly county court, and either formally, with officers and general rules, or informally, discuss the different subjects relative to their agricultural interest in their county—crops, cattle, horses, mules, labor, prices, best modes of cultivation, curing, preserving, sale, and markets; different crops and their profits, improvement of stock, or the leading staples of the county. This seems to have been the favorite system of the South. Large land owners and managing large farms, and the general tendency being centralization, it suited the "*farmer on horseback*" to ride to town and have a talk on this subject. It was a beneficial system, and did much to promote agriculture in the entire South.

2. The "debating society" system, much practiced in the Northwest, having weekly evening meetings at the school-house, with subject for discussion selected, and disputants either volunteer, are

appointed, or chosen to speak pro and con, generally run well during winter, but as nights shorten, are adjourned either to shorter days or *sine die*. A very good one, conducted on this system with George W. Kinney, President; D. G. Jones, Secretary; Chas. Sutphrin, Corresponding Secretary, and a number of very intelligent farmers, residing near Snow Hill, North Missouri, has in some years much improved the stock and raised the price of lands in that vicinity.

3. The social system, generally adopted in the Ohio Valley, of which the Quaker Bottom Farmers' Club is the pioneer, being organized as early as 1844, by Capt. H. N. Gillett, President; Thomas Walton, Secretary; Thomas Proctor, Corresponding Secretary; Thomas Gardner, Vice President, and some ten or twelve members, and has been in successful operation ever since, whose constitution and practice has been practically adopted by a number of societies in the Ohio Valley, and attended in almost every case with permanency and success, the promotion of intelligent cultivation, advancement of morals—in a word, Civilization. I do not think of a better page or two to add to the Missouri Agricultural Report than to give (from memory) a synopsis of their constitution and laws, and a page or so of the secretary's report, thereby giving the reader an insight of their *modus operandi*, which may form, with such alterations as locations and circumstances require, a plan for future organizations of like character in Missouri:

CONSTITUTION.

1. *Name.* Rome and Union (townships) Farmers' Club of Quaker Bottom (P. O.), Lawrence county, Ohio.

2. *Object.* An association of cultivators of the soil, for mutual information, protection, and benefit; to make and report experiments in the cultivation, care and productions of the field, the garden, the orchard and the farm; the improvement of our farm stock, whether in the stable, the cow-pasture, the sheep-walk, the pig pen or poultry yard, or the barn, the cellar, the pantry or tool-house. The discussion of such subjects, the reading of such essays, books or papers as may be deemed best for the development and dissemination of agricultural knowledge; also, to engender a kind and generous feeling in the neighborhood, and to enjoy each others hospitality.

3. *Membership.* Shall consist of the original signers and such persons as may become members, who shall be proposed by some member, and if unanimously elected, upon the payment of one dollar and signing the constitution and by-laws, thereby assenting thereto, shall be entitled to all the rights of an original corporator. The wife of each member is an *ex-officio* member of the club. Honorary members, consisting of such persons as the club may consider have done something for the benefit of the club, as may entitle them to such honor, may, by resolution of record, be so constituted, and will be elected to sit with us and vote, except at elections.

4. *Officers.* President, Vice President, Secretary, Corresponding Secretary, Treasurer and Librarian, whose duties shall be such as is usual in deliberative bodies, and such as the club may order.

5. *Elections.* Officers shall be elected at the first meeting in the new year, annually. Vacancies, either temporarily or, permanent, shall be filled by the next in rank present, and the last vacancy filled by the President, or by election by the club.

6. *Meetings* shall be held on the last Friday of each month, commencing at 10 A. M. at the house of a member. The first series of meetings shall be decided by lot, each member drawing for the month for his meeting, but may be transposed or changed for cause by the club. Special meetings on other days may be held, or an adjournment for a longer period may be made by the club. Families of members, honorary members and persons invited by the President or by the landlord of the meeting may attend the meeting.

7. *Dinner.* Believing that good cooking is conducive to good health, and good health to the proper consideration of any subject; therefore, it is expected of each member, that at the meeting of the club at his residence, he shall, with the assistance of the "gude wif," cause to be prepared a good, substantial farmers' dinner for the club.

8. *Business.* The President shall preside and keep proper order; in the absence of the orator shall speak on the "leading subject," or appoint other persons so to do; select "leading subject" for the next meeting and orator for the subject. It is expected of members to make such remarks, inquiries or comments on the orator's remarks, or those of any other person as may be respectful and relative to the subject, or any other agricultural matter.

Members. It is expected that each members shall make one or more experiments with some farm crop, and report manner of cultivation, cost, profit or loss (especially any failure, and probable cause), mode of managing farm, orchard, garden, vineyard, horses, cattle, swine, sheep, poultry, bees—in short, to communicate his experience or knowledge, obtained either by experience or reading of books or papers, or other manner, of any or all subjects relative to the farm, or the profitable sale of its products; assisting each other to make agriculture not only pleasant but *profitable.*

Lady Members. Wives of members are expected in like manner to give each other, or the club, their experience in the house, the kitchen, the dairy, the poultry-yard, or other matters pertaining to their department.

View. The club shall at each meeting view the landlord's farm, and carefully examine the condition of the farm, mode of cultivation, stock, improvements, and faults, of all of which the Secretary shall keep a minute, to be made at next meeting, making suggestions of improvements and other matters, subject to comment and alteration or amendment.

9. *Tax.* When the dues are not enough for incidental expenses, a per capita tax may be levied.

10. *Books.* The librarian shall have the care of the books and papers belonging to the club, and distribute the same, keeping a list of the recipients thereof.

11. *Expulsion.* Members may be expelled for conduct not becoming a civilized farmer, by two-thirds vote.

12. *Amendments.* Alterations or amendments to this constitution may be made at any regular meeting, by two-thirds of the members voting for such change; provided, one month's notice be given to the club of the proposed amendments.

Adopted by unanimous vote of the members, December 27, 1843.

HORATIO N. GILLETT, *President.*

THOMAS WALTON, *Secretary.*

HALL'S SPRINGS FARM, January, 1864.

Club met at Wm. D. Hall's, in pursuance of the constitution.

President Gillett in the chair.

Secretary not acting, James McVey appointed *pro tem.*

Prayer by Rev. H. Z. Adams.

Report of last meeting being read and approved, except the secretary *pro tem.'s* report of the "Farm View," which was this day reported as follows:

Club meeting for December, 1863, at Orchard Valley Farm (G. T. Walton's). Very fine orchard, and said to be profitable, but nature, situation and soil appear to have done more for it than the owner. The secretary *pro tem.* is of the opinion that the Colonel has added to his surveying, farming and other duties, the small fruit business, as much of the orchard and fence rows are in luxuriant blackberry bushes and other native shrubbery, perhaps a little too thick for profit; and also, that if he was as good at practical farming as he is at surveying, or as his wife is at getting up a club dinner, Orchard Valley would look better. Barn and fences and gates need repair. Very good cistern, house and cellar. Remarkable fine native grape on front of house. Had grapes an inch in diameter last August.

Secretary read letter from J. H. Klippart, Secretary State Board of Agriculture, presenting Agricultural Report; one from United States Commissioner, I. Newton, with United States Agricultural Report and sundry papers of seeds; also, same from Hon. H. S. Bundy, Member of Congress. Corresponding Secretary ordered to return letters of thanks.

President announced the leading subject, "What is the most profitable fruit for this vicinity? Col. N. Cox, orator, who having thoroughly investigated the subject, of course, made it very interesting. His conclusion was that the Rome Beauty apple was at present the

most profitable. Thinks the small fruits and vegetables will alternately be the most profitable on the Ohio river bottoms.

Club requested a copy of address for publication in Ironton Register.

Thomas Proctor, late Corresponding Secretary, but now editor of the Macon Argus, Missouri, made some interesting remarks relative to the prosperity and history of the club. Thought North Missouri only needed a few things to make it the garden of the world; a good farmers' club was one of the wants.

Dinner—which was just what was wanted. Among the many good things was the light cornbread, in the making of which Mrs. Hall is noted. Twenty members and their wives were present, besides near one hundred visitors.

Farm View—All the members, and many of the visitors, went on a search to find fault, either with house, orchard, barn, sorghum factory, farm, or something. Failed to find it. Mr. Hall made some suggestions of improvement.

Returned to the rooms, investigated the fruits, etc., of members brought in.

By Capt. H. N. Gillett—Lady Apple, Rome Beauty and twenty other varieties, three winter pears, large onions, six different specimens seedling potatoes, peaches.

Thomas Gardner—Twenty-three varieties apples, grapes, turnips, beets.

Miss Eustacia Gardner—Bouquet of flowers. Miss Rose McVey, bouquet. Both beautiful, contrasting with the snow.

Colonel Cox—Apples, pears, quinces, grapes, peaches.

Wm. D. Hall—Osage Orange, apples by the bushel, with knife and other conveniences, several samples of sorghum, molasses, candy and *bona fide* sugar.

Judge Reckard—Large ears of corn, big wheat stalk, apples.

C. Turley—Pears, apples, grapes, sweet potatoes, sweet corn, large corn.

Jacob Proctor—Corn, potatoes, Rome Beauty, Romanite, Russetts.

Alanson Gillett—Sugar cane, Spanish moss, Palmetto from Louisiana.

Robert Hall—Cabbage, large corn, citron, melon, pumpkin.

G. T. Walton—Southern pea, native grape, very large, Rome Beauty.

John P. Eaton—Very large corn, tall timothy, monster Rome Beauty.

Elhanan W. Wakefield—Rome Beauty from the Hill Top orchard.

Thomas Walton—Seeds of the white thorn, from Yorkshire, England. The true English hedge plant succeeds with him.

Thomas Procter—Rawles' Janet from Missouri, remarkably large and fine.

In the Ladies' Parlor—Quite a display of juveniles, the raising of

which does here appear to be as important a branch of farming as the raising of Rome Beauty apples or "quaker bottom pigs."

An hour devoted to general conversation. A few of the subjects, the war, our boys, prices of apples, wheat, hay, horses, labor, underdraining, fences; prospect for fruit; wheat; setting out orchard; Missouri, by Thomas Proctor and his former students.

Order being restored, Rev. H. Z. Adams made some very good remarks, one of which to the effect, that organizations of the farmers, to promote the knowledge of workings of nature, were in every case great moral societies, promoting moral and religious sentiments, and elevating the mind and character of the people.

H. Radford proposed for membership F. Marion Rickard. He elected. Being introduced, he requested the next meeting to be at his place, "Sunny Side Hill," as he joined to get information, practical agricultural knowledge, was willing to give and glad to receive information.

Isaac Miller, being entitled to the February meeting, assented to the change, which was adopted.

Thomas Walton presented a communication from Wm. D. Kelley, President Lawrence County Agricultural Association, stating that the managers had requested the following societies to prepare a list of premiums, on the different subjects, to the amount of annexed appropriations:

Ironton Mechanical—Manufactures of all kinds, $600.

Ironton Horticultural—Small fruits, grapes, wines, vegetables, poultry, $400.

Hanging Rock—Horses, mules, oxen, coals, cast iron, ores, $500.

Rome and Union—Apples, other fruits, wheat, corn, orchards, $500.

Symmes—Cattle, hogs, sheep, hay, oats, roads, $500.

Committee to make such list, and report to next meeting: Geo. T. Walton, Wm. T. Radford and Judson Garner.

President announced leading subject for next meeting: "How shall we Fence?" Dr. Gerrard R. Ricketts, orator.

On motion of John Pierce, Dr. R. N. P. McDowell was elected an honorary member.

Adjourned to meet at F. Marion Rickard's.

H. N. GILLETT, *President.*

JAMES MCVEY, *Secretary pro tem.*

HICKORY GROVE FARMERS' CLUB.

BY G. W. KINNEY.

SNOW HILL, ST. CHARLES CO., MO.,
January 28, 1870.

The Hickory Grove Farmers' Club was organized Thursday, November 26, 1868.

Thomas H. Bolles, chairman, D. G. Jones, Secretary *pro tem.*

A committee upon permanent organization was appointed consisting of Charles Sutphin, Thomas Davis and G. W. Kinney, who reported as follows:

"The object of this association shall be the discussion and consideration of such matters as immediately pertain to the farm, and such other subjects as are of importance to the prosperity and well-being of the community.

"No subject of a religious or political character shall be allowed before the club.

"Any person may become a member by signing the constitution and complying with such regulations as may, from time to time, be required.

"The ladies are constituted honorary members, and as such are cordially invited to attend.

"The permanent officers shall be a Chairman, Assistant Chairman and Secretary, who shall be elected semi-annually. Other officers may be appointed if found necessary.

"The expenses, if any, shall be defrayed by voluntary contributions.

"All are invited to become members and take part in the deliberations."

The report was unanimously adopted and made the constitution.

The club honored the following gentlemen by electing and installing them permanent officers: Geo. W. Kinney, of St. Charles county, chairman; T. H. Bolles, of Warren county, assistant chairman; D. G. Jones, of Warren county, secretary.

At its second meeting, Mr. C. S. Osgood delivered an address upon "The importance of Farmers' Clubs," which was followed by a discussion upon "Plowing."

At another meeting, Mr. D. G. Jones delivered an address upon "The Culture of Wheat" which was listened to with marked attention,

and, no doubt, caused many of the members to engage more extensively in growing it.

Mr. T. H. Bolles read, at another time, an essay upon "the Resources of Missouri."

Mr. J. C. Casner read an essay upon "the Care of Tools and Implements," which was to the profit of many of the members.

Mr. C. S. Osgood delivered an address upon "Fruit Culture," which was followed by a discussion upon the same subject, participated in by all the members.

The following were some of the subjects discussed at various times during the winter after its first formation: "Shall we encourage immigration into our community;" "Improvements of our public roads;" "Grass;" "Stock Law;" "The most profitable crop for our vicinity;"—on this last subject the conclusion arrived at was *grass*.—"Corn culture;" "The dairy," and others.

At the end of six months the following gentlemen were elected officers: Henry Blattner, chairman; W. C. Lewis, assistant chairman; J. C. Casner, Secretary.

The regular meetings, once in two weeks, were continued until after corn planting in the spring, and were then adjourned until after the busy season was over.

On reassembling, Mr. H. G. Quincy read the following, which will give an idea of what we had done and how much we had profited by our meetings:

A hasty review of the proceedings of this club since its formation, might not be uninteresting, as we are commencing a new series of meetings. I have nothing new to offer to members who have attended all the meetings, and participated in the deliberations of the club, who came through storm, mud and cold in the pursuit of knowledge under great difficulties. I think all can refer to the meetings with some degree of satisfaction and profit. Some of the topics discussed had the happy effect to bring out the *live* members of the club, and we are anticipating rich intellectual treats when Messrs. Jones, Kinney, Bolles, Sutphin, Casner, Osgood and others, shall address us again. We have also accessions to the club this year. Live men of talent and experience have come among us, who are able and willing to give us advanced ideas upon farming.

Since the discussion upon stock breeding, we have seen our neighbor Sutphin importing, at great expense, from Ohio, some fine Magie hogs, and a blooded bull, both of which came home from the Warren County Fair with the prize ribbons upon them.

Mr. A. P. Mills has imported from Michigan, and Canada some fine short horn cows, and a bull, pronounced by Col. Colman, not to have been excelled at the St. Louis Fair; also, some superior full blooded Leicester and Cotswold sheep.

Our neighbors Watson, Casner, Kinney, Jones, Astrop and others, have shown that they mean to profit by what they have learned—to

practice what they preach—and have procured Chester Whites, and their hog yards already show a marked improvement over the old "hazel-splitters." We notice that friend Jones always buys a good cow, when he sees such an one for sale, regardless of price; he not only talks dairying, but is coining money by furnishing wealthy families in St. Louis with rich, golden butter at fifty cents per pound, the year round.

We have seen members of the club digging cellars the past summer, and it seems very strange that so many of our farmers, and good farmers too, live along from year to year, without the convenience of a good cellar.

The discussion upon farm buildings seems to have had its effect, new buildings are going up all around us.

We see members of the club taking pains to procure new varieties of seed. Tappahannock wheat has been sown quite extensively. Our neighbor, Osgood, raised a fine crop of Norway oats, and R. J. Watson took the premium for best variety of corn exhibited before the Club. Early Goodrich, Early Rose, Harrison and other new varieties of potatoes are becoming quite common.

Cooking food for stock was before us, and several members have procured pans or kettles and boil all their feed; some have facilities for grinding also.

Farm machinery was a topic one evening, and as a consequence we find gang plows, sulky cultivators and hay rakes, power shellers, horse corn planters, drills, etc., in operation where none were found before. Reapers have taken the place of the cradle. Staid, sober old stand-by farmers who have nearly worn themselves out swinging the cradle, now ride about their fields superintending their abundant harvest. An agent of one, the Kirby Combined Reaper and Mower, informed me that he had sold over fifty machines the past season in one immediate vicinity. We see farmers using fertilizers who perhaps never thought of doing so before; manure heaps, the accumulation of years, have been hauled into the fields.

We notice the march of improvements all about us; men taking the plow handles who have grown poor renting their lands to be sapped and exhausted.

We see progress stamped on every man's countenance, and shall we not say that we see daily the influence of the Farmers' Club in our midst.

The paper read at our second meeting by the chairman, G. W. Kinney, on the subject of "Deep plowing," was a valuable essay, well arranged, argumentative and conclusive. It was not only published in several of our weekly journals, but was thought worthy of a place in our State Agricultural Report for 1868. We had ably presented to us the reason why deep plowing will pay, and it is the pay we want. It certainly costs something to plow deep, but it cost time and labor to plow at all. If our deed allows us any depth we wish, let us go

down into the subsoil and cultivate more of this prairie soil to the acre and double our crops. Land plowed deep is certainly better able to withstand the excess of the season, either wet or dry.

The address of Mr. C. S. Osgood, on "Farmers' Clubs as an Institution," was a very able one, and highly interesting to all who had the pleasure of hearing it.

From Mr. D. G. Jones we had a valuable statistical address upon a subject with which he is entirely conversant. An honest Pennsylvania miller's idea upon the "Culture of Wheat" as a staple crop for Missouri is certainly worthy of consideration. It is regretted that this and the preceding address were not reported for publication.

Mr. Chas. Sutphin gave us some valuable hints on farming from an intellectual standpoint. We should keep a debtor and credit account of profit and loss, so we profit in the future by the losses of the past. It is hoped that members of this club and others who read those hints have profited by them, and can tell us to-day on which side of the ledger stands any crop they have raised the past season.

Mr. J. C. Casner's essay, "Take care of your tools," should be published in the Farmer's Almanac, and go into every household in the land. His direct and sharp hits were felt by every member of the club, and you will see fewer plows, harrows, reapers, etc., in the fields this winter than formerly.

The "fence question" was up, and I think the club is in favor of a law restraining stock from running at large, such a law as is in force in New York and other Eastern States, to the advantage and profit of every man. It is a long way in advance of the relic of barbarism we live under in Missouri, a law that allows a man to enforce the penalties himself, a neighborly law, which in certain cases allows a man to shoot trespassing stock. I fear the shooting does not always end there.

"What are the best and most profitable crops for this section of country?" was well discussed; oats being considered the surest crop, and at present prices pay well. Corn was recommended only for home consumption. English grasses flourish well here, and consequently dairying was recommended. The proposition to send milk to St. Louis by railroad, when the bridge is completed at St. Charles, met with much favor. A cheese factory might be made to pay well. Fruit was recommended for home consumption, and, when we raise sufficient to induce buyers, would be profitable to sell. Broom corn was recommended highly, many thinking it did not exhaust the soil. Tobacco was considered one of the most profitable as well as most exhaustive crops.

The question, "would it be advisable for this club to hold out inducements for emigrants to settle among us?" was decided in the affirmative, provided they bring greenbacks, pay their bills and keep their hogs at home.

On farm machinery Mr. Osgood made the opening remarks; was

decidedly in favor of more and better than most farmers in the vicinity have been content with. The combined reaper and mower we could hardly do without in the hurry of an abundant western harvest. An eight horse sweep power with machinery to attach for threshing, shelling, gridding, sawing, cider making, etc., is a great convenience. A steam engine would be much better, and when we can plow these western prairies by steam, we can farm scientifically. Use more brains, less muscle, and have more time for amusement and mental improvement. The merits of a variety of farm implements were discussed, and all seemed in favor of having a good supply in good condition to use, *and lend our neighbors*. The horse hay fork was recommended as a labor-saving implement—not only the fork but the hay to pitch, and a good barn to put it in—never mind the old house until you get a good barn, the saving with this will soon build a good house.

"Farm labor" was a delicate subject to discuss, and no satisfactory conclusion reached, unless we import a few hundred Chinese.

"Roads" were discussed, but our overseer not being present, the suggestions proved of little practical use, and each traveler still picks his way as best he can, and leaves the mud, ruts and gullies for the next.

"Farm teams." Oxen are used by some of the members who consider them profitable, as they get their growth as well as labor, and can be turned into beef; their harness is also less expensive than any other team. The mule had some firm friends, but received hard thrusts from others for his waywardness. I think perhaps mules could stand the hard usage under the *old dispensation* better than horses.

Horses seem to be in general use about here at present, and there seems to be quite a surplus, such as they are. Perhaps we should adopt the French custom, "eat horse."

"Corn culture" was brought up, and as the time for planting was at hand, an interchange of ideas as to how and when to put the seed in the ground was very opportune. Level cultivation was recommended, but seemed rather impracticable this season, as with the wet came the weeds, and the old style turning plow was the only implement used to advantage. Many use the single, double and triple shovel plow, and a few the riding cultivator, of which many seem jealous. With the umbrella attachment we think it just the thing for *lazy men*. We used a two-horse planter on mellow ground, but it having no gauge wheels, some of the seed was in so deep it did not germinate, and some so shallow it was scarcely covered. The saving of labor and time in planting is an important item, but should not be at the expense of the crop. We have learned that a man must be "up and dressed" early in the spring if he would feel sure of a good crop of corn or oats.

Our chairman, Mr. Astrop, did the prettiest thing last season: he

just spilt his oats in the mud, and, without plow or harrow, grew the finest crop about here. Our Eastern friends would hardly say "shrewd," but "shiftless," were they to see us sowing oats on corn ground without plowing. But when we are with the "Romans," we suppose there are some good reasons for doing as they do, and it will not always pay to wait and learn everything by sad experience."

At the expiration of the second six months, Mr. John Astrop was elected chairman; Mr. W. C. Lewis, assistant chairman; Mr. H. G. Quincy, recording secretary, and G. W. Kinney, corresponding secretary.

We have this winter listened to a very able address from the Hon. N. J. Colman, an abstract of which may be found in the *Rural World* of January 15, 1870. On this occasion the Colonel touched considerably upon Free Trade, as it affects the farmer, which resulted in a clash of arms with Mr. C. S. Osgood, and stirred up many to investigate the subject more thoroughly. It also resulted in Mr. Hayes, a lawyer of Wright City, making a request to discuss the same subject before the club. This came off at the next meeting, and called out many friends of a tariff, among whom we may mention Dr. C. W. Pringle, A. P. Mills, D. G. Jones, and others.

Mr. C. W. Murtfeldt also delivered an address upon "Dairying," which was decidedly the best thing we ever listened to on the subject. An abstract of this may be found in the *Journal of Agriculture* of January 27, 1870.

Mr. Landon Rummins delivered an address which we hear spoken of very highly, but not being present, we hope he will excuse us for simply referring to it.

W. C. Lewis read an essay upon "Farming, as compared with the Mechanics' life" upon which he was able to speak knowingly, having tried both occupations—of course, farming received his preference.

Mr. J. E. Leamard read an essay upon "Missouri, as she is and is to be," which showed that he had considered the subject thoroughly.

The proposed stock law was discussed two evenings, showing most of the members in favor of it. At a subsequent meeting resolutions were unanimously passed instructing our members in the State Legislature to vote for such a law as will make owners of stock responsible for the damage done by the running at large of such stock.

Mr. D. G. Jones and G. W. Kinney, were delegates from the club to attend the annual meeting of the State Board of Agriculture, and the latter was elected a member of the same, as a compliment to the club for the interest they had manifested in the agricultural advancement of the State.

We hope another year more clubs will be represented, that discussions will be had upon subjects of vital interest to the farmer, and that the Board will not be compelled to hesitate and hunt about for live men to fill the vacancies which may occur in its membership.

JEFFERSON COUNTY FARMERS' CLUB.

DE SOTO, JEFFERSON COUNTY, MO., December 26, 1869.

CHAS. W. MURTFELDT, ESQ.:

SIR—In obedience to your request, I herewith present you with the organization and working of the "Jefferson County Farmers' Club and Fruit Growers' Association."

This Association was organized on the 18th day of September last, under the above title, and is convened on the first Saturday in every month at the Club-room at De Soto. The officers are:

W. G. Herold, President.

J. J. Squire, Vice President.

G. H. Cherry, Secretary.

L. J. Rankin, Treasurer.

J. J. Squire, Corresponding Secretary and Librarian.

Standing Committee on Vegetables—W. H. Mann, W. H. Parkinson and ——— Cunningham.

Committee on Fruits—W. S. Christian, J. J. Squire and W. F. Bowen.

Our Club has been well attended and considerable interest taken therein. The discussions are spirited, entertaining and profitable, and every member feels that he is not only being benefited individually, but that he is contributing to and encouraging the growth and progress of agricultural science, than which nothing is more needed in this section of Southeast Missouri.

Our first subject before the Club for discussion was, "The preparation of Soils," which has been continued on account of its extended scope, being, as it was, at the base of all agricultural production. In the main, the position has been sustained that very deep plowing and a thorough stirring and disintegration of soils are necessary to success.

Other topics of interest to Agriculture have been considered, among which, and of paramount importance, is the "Stock Law." This was well discussed at our last meeting, though by no means exhausted. The arguments in favor of the continuance of the law, as now existing, was very meager and easily disposed of, while those in favor of a change were well and forcibly sustained. The prevailing idea is that the Legislature should so frame a law empowering town-

ships or districts to elect, by their magistrates, whether to fence in their stock or let them run at large.

On the 3d instant, the Missouri School of Mines met in De Soto, and held a joint session with the Jefferson County Farmers' Club, which was of considerable interest to this section, and we opine to the State at large. The joint session was entertained by addresses from Prof. Forest Shepperd, Jas. E. Ware, Esq., the Rev. Chas. Peabody, J. C. Clark and others. Prof. Shepperd's address was exceedingly interesting, a *resume* of the developments, discoveries and noted circumstances in the mineral, metallurgical and engineering progress of the times. Rev. C. Peabody's address was quite felicitous and spirited, illustrating in a clear and graphic manner the allied interests of the miner and farmer, wherein he cited the true relations existing between art and industry, mining and agriculture, at the same time showing the comparative value of Southeast Missouri with the best portions of the mineral regions of the globe—illustrating the fact that no part of the world combines more of the elements of National and State wealth than Missouri.

Apropos to this: The Missouri School of Mines deserve more than a passing notice, representing as it does a highly important branch of industry, and using its best energies to the enhancement of industrial pursuits, in the practical knowledge of those elementary principles so essential to a full exemplification of the arts. Skilled labor without the active brain is impossible, so with perfection in art; and a mere knowledge of elementary principles without their practical application by the skilled mechanic, cannot aid much in industrial progress. It becomes, therefore, a matter of vital importance to Missouri as a State that she should seek to encourage, by every means in her power, the advancement of elementary science and industrial application together, to the end that our vast resources may be developed and our wealth thereby increased. It, therefore, becomes our Legislature to consider well the proper distribution of that munificent grant of Congress for the endowment of Agricultural and Industrial schools in the State. South Missouri has especial claims to a portion of this grant, and the School of Mines can nowhere be so well sustained in every essential particular, to a manfest benefit of the ends to be realized, than to be located where Nature's laboratory is as magnificent and full in its avails, nay, infinitely more so, than the grant itself.

In regard to the best varieties of "Sweet Corn" for table use, I am at a loss to decide for this section of country. Soil and climate has considerable to do with the growth and quality of sweet corn, as with some other products, That which seems to give the best results East, is far from being satisfactory here. My experience, however, in Missouri has been quite limited; hence I will not venture an opinion at present. I cultivated, the past season, for my canning purposes, the "Evergreen Sweet," "Adams' Early," and "Smith's Early White."

The first of these is very prolific and a good variety; its quality, however, cannot be said to be quite up to the standard of sweetness. The other two are not sufficiently prolific for profitable cultivation. "Smith's Early White" is an excellent variety for canning, but lacks sweetness. It maintains its white character in an eminent degree and preserves well. I intend to experiment with other varieties the next season. My aim is to procure a white variety which will combine the proper standard of sweetness and be sufficiently prolific to be profitable for extensive cultivation.

The past season was not good for peaches through Southeast Missouri, i. e., for budded fruit. Seedling peaches were abundant, but by far too small for canning purposes, even if the quality had been up to requirement. Peach growers are prone to allow their trees to bear too large a quantity, hence the *small fruit*. If they would take pains to reduce the quantity upon each tree, just after the fruit is set, to about *one-third*, the crop would not only be larger in size, but better in quality and far more valuable. A peach grown to a proper size is equal to three of the ordinary growth of the past season, and *two-thirds* more valuable, from the fact that it has but *one* stone, and that no larger than the stone of the small peach. If the object was to grow *peach stones*, the present mode of cultivation is perhaps well enough, but for *fruit*, it is both unwise and improvident. It is with the peach tree as with the grapevine; it should be allowed to mature fruit *only* in proportion to its capacity.

Yours sincerely and respectfully,

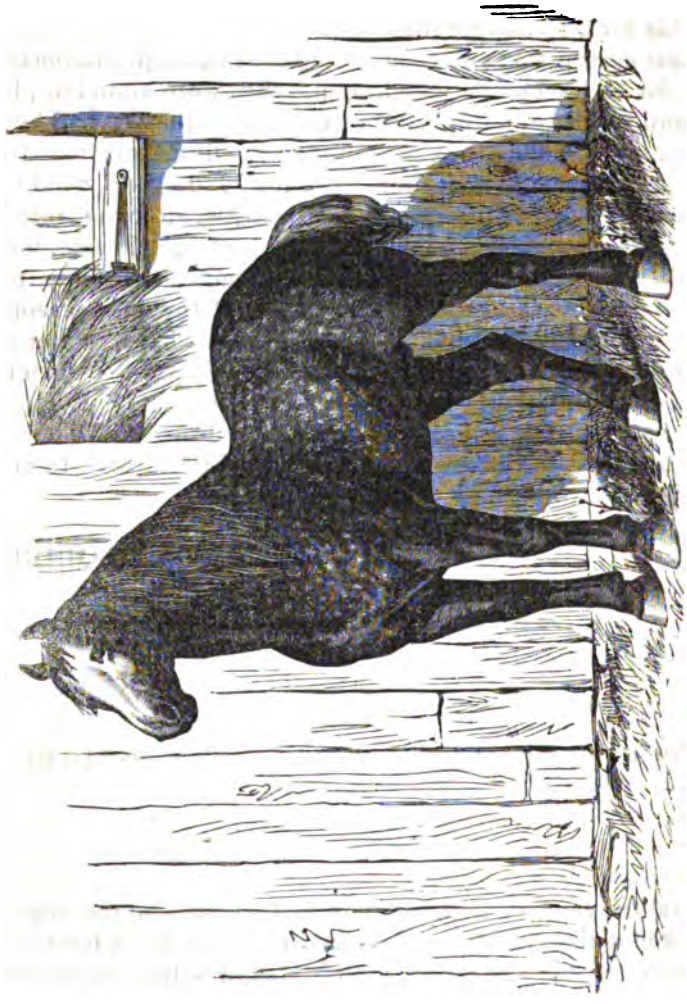
JAMES J. SQUIRE.

IMPORTED PERCHERON STALLION, "BISMARCK."

Those of the readers of this report, possessing also the report of 1868, will recognize in the accompanying engraving a familiar picture. It has often been asserted, by our best breeders, and the writer subscribes to the point, that for the best coach horses as well as for good sized farm horses, we must breed large well developed mares to a thorough-bred stallion. Where are these mares to come from? Are they within reach of the farmer? Certainly not, if we mean that the mares shall be thorough-bred also. These would cost too much, for even an untried colt cannot be bought for less than five hundred or even a thousand dollars, especially if the parents have exhibited any considerable speed. There is no alternative then but

to look to cold blooded stock for mares. If such can be had, that show considerable speed as well as size, and besides, that most valuable of all qualities, endurance, then we have a stock of superior merit, upon which to breed the *thorough-bred* and from which to raise valuable coach and farm horses.

The writer saw *Bismarck* soon after his arrival from Europe, while just recovering from the effects of a sea voyage, and of course



IMPORTED PERCHERON STALLION "BISMARCK."

not acclimated, and again on the farm of his present owner, A. E. Trabue, Esq., near Hannibal, Mo., about a year after that, and can say truthfully that he never saw greater improvement in the general appearance of any animal, in so short a time. We introduce his picture and a few remarks from the pen of his owner.—ED.

"*Bismarck*," is between 17 and 18 hands high, (stallion measure) a very dark dapple grey—short couple—very short fetlocks,

round in the barrel and of immense muscular power in proportion to his heighth. He possesses in a high degree, the peculiar characteristic o the Percheron—to wit: rapid draught.

The history of "Bismarck" is briefly this:

Mr. J. K. Clark, a gentleman of wealth, well known in St. Louis, traveling in Europe in '68, was astonished to see with what ease and speed this race of horses dragged the heavy stone carts through the streets of Paris, a draft power to each of 5,000 lbs. Assisted by the presence and judgment of the equerry of the Emperor Napoleon, Mr. Clark secured two of the best of these horses, for service in his native State, Missouri. "Bismarck arrived from Europe in the summer of 1868."

SMALL FRUITS AND VEGETABLES; OR, WHAT MAY BE DONE IN ONE YEAR.

BY B. FRANK SMITH, OF JEFFERSON COUNTY.

We came to Jefferson county in the spring of 1869, with the intention to raise small fruits and vegetables for the St. Louis market. It is somewhat embarrassing for me to write an article for the Agricultural Report until our small fruits come into bearing; but we can give some idea of one summer's work, and then the reader may judge of what may follow if next season should prove favorable.

We have about twenty acres that were cultivated in small fruits and vegetables. Here we may remark we found work enough for two men, and more than two hands can cultivate thoroughly. Large fruit farms are a curse to the country. If men engaged in the fruit business would content themselves with small places, well tilled, and let thorough culture be the watchword, we would not hear so much complaint about expenses eating up the profits, etc. If we are to be allowed to give our opinion, we may say there are but few men capable of cultivating large farms profitably, either for grain or fruit. The best paying fruit farm we ever saw the owner cleared eleven thousand dollars from thirteen acres in two years. Alongside was a fruit farm of eighty acres, from which the owner had never cleared

expenses. He had peaches, grapes, strawberries, pears, etc., but it has taken all he has ever made, and more, to pay expenses.

But to return to our own experiments. We planted on our twenty acres last spring three acres of strawberries, two and half of blackberries, one acre of gooseberries, two acres of raspberries, one hundred and sixty-two early May cherry trees, seven hundred peach trees, two acres of grapes. One acre of Miami raspberries were in bearing when we came in possession of the place. The first thing we did was to clear the cornstalks off the ground for strawberries. We then plowed the land as deep as we could with two horses, it being rooty, and used a half shovel plow after plowing; we harrowed the ground well, and marked it off in rows with a single shovel plow, three feet apart. We set our plants beside the furrow, smoothing the ground slightly with the foot; set plants ten to twelve inches apart; filled up the furrows with the hoe as soon as planting was done. This laying off ground with a plow for strawberries may seem odd to some, as most men use a line, but I can say from experience that this is much the quickest way. Some may object, and say the rows would be crooked, but I can show rows that are so straight that that it will take a close observer, after the plants have grown a few months, to tell the difference. If I had a thousand acres to set out, I would not have a line in the field, but simply a small plow and an old, steady going horse. I kept a few plants a couple of weeks after setting, to replant if any did not come. This is easily done. I kept plants very well three weeks by digging a hole in the ground a foot deep and about four to five feet square; put the plants in, throwing over a little straw, dampening it with water, and then putting on a thin coat of soil. By keeping a few plants over we were prepared if anything should happen to the first planting to prevent their coming, to remedy it. We found occasion to replant some where they had dried out, and in this way got the best stand of plants we ever saw. Many strawberry growers have poor stands from having poor hands to plant them. Employing boys to set plants because they can be had cheaper is poor policy. Better hire men for five dollars per day than boys for two shillings. We write this from a little experience we had years ago. For setting plants we used a small trowel, two inches wide and eight inches long; have tried several ways setting plants, and found this the best tool to use. We cultivated our patch eleven times with cultivator and hoe. The cultivator is one of our own inventions (not patented); the teeth are small, made out of $7\frac{1}{8}$ (square) iron, and bent in shape of a bull-tongue plow; can open or close it to any width desired, and can run it six inches deep if necessary. The runners in the strawberry patch have filled up the space between the plants, and the rows are in many places a foot wide; did not allow the runners to fill up the middle of the row. Our patch now (middle of November) looks as well as any we ever saw, and if we do not get

three or four hundred bushels of berries we shall feel sorely disappointed.

We planted two and one-half acres of Lawton blackberries, three by eight feet apart. We prepared the ground pretty much the same as for strawberries; cultivated it over eight times with hoe and cultivator. Our blackberries were put in rather late, though we got a fair stand. We think fall planting best for blackberries.

Of gooseberries, we planted one acre. The variety, Houghton Seedling; planted five by five feet, having room for two hills of potatoes between each the hills of gooseberries. By doing this we did not lose the use of the ground the first year, but raised one hundred and forty bushels of potatoes from the gooseberry patch.

We think the gooseberry can be made profitable at two dollars per bushel. In this latitude they will be ready for market by the 10th of May; can run on them until the 25th of May, when strawberries come in; then let them rest till strawberries are gone, and they will be in marketable condition.

The gooseberry is a safe investment. If the commission merchant does not sell them to-day he can sell them to-morrow or next week. When our gooseberries come into bearing we will calculate on two hundred dollars per acre net.

We planted one acre of Miami raspberries in addition to one acre in bearing when we came in possession of the place. We shall try to make the two acres bear seventy-five bushels per acre by thorough culture and summer pinching. The acre now in bearing we pruned or pinched back three times during the summer. The first time, about the 26th of May, when about three to four feet high, in two or three weeks the laterals were ten to fifteen inches long; then we pinched out the buds of each. In three or four weeks they had thrown out other laterals, which were treated as before. The rows now are almost as impassable as a hedge fence, and we feel confident some stools will yield a gallon of berries. This summer pinching is an experiment with us, and we feel assured that when we harvest the fruit we will be abundantly rewarded for our time and extra labor. A few years ago we cut some canes back with a knife after they had grown some six feet long. The cane was soon decayed five or six inches below the cut, and no more laterals came after than had before. The cane is not the least affected when summer pinched, in the way I have described, and then the canes are stronger and stand up better, and it does away with the necessity of staking and tying up. However, if timber is plenty and labor cheap, we would say tie up to stakes, and then you will be insured against storms.

We planted five hundred Clark raspberries; also, five hundred Davinson's Thornless Black Cap. They have a fine growth of canes for the first season. They are highly recommended by parties that have seen the fruit from them. The Thornless is said to be ten days in advance of the improved Doolittle. If so, it will a valuable market

berry for this locality, lapping on the strawberry season at least ten days.

We planted one hundred and sixty-two Early May cherry trees, losing but one tree. We expect in three years to gather the fruit of this fine variety of cherries. We consider it the best of all the early cherries. The cherry, next to the peach, is one of the most productive fruits we have in our country. No farmer or fruit-grower should be without this fruit. It is easily raised, and as yet it has no insect enemies that we know of.

We set out seven hundred peach trees—one hundred Hale's Early, two hundred Early Crawfords, one hundred Late Crawfords, and one hundred old Mixon Freestone. The balance we made up of Heath Cling, Stump the World, Troth's Early, etc. We are aware that the Hale has been almost condemned in the West, but it has some good qualities. It is hard to winter kill, bears well, often paying well the fourth year for all the trouble and expense of planting and growing. The Crawford has done so poorly the past three years that if we had to set another orchard of the number of trees we have we should plant three hundred Hale's and leave out the Crawford.

We planted an acre of Alton Nutmeg melons, and had hundreds of melons. The ground was literally covered. We planted on a southwestern slope (first year land), in hills six by eight feet. They did not pay us the cost of the seed. The originators claim to have made a handsome margin after packing and shipping three hundred miles to market.

We raised a quarter acre of tomatoes, which was a non-paying crop this season.

The amount of our potato crop was two hundred and fifty bushels, principally raised between gooseberries and blackberries. The varieties planted were Early York and Harrison, and two pounds Excelsior, from which we dug four bushels fine potatoes. We consider the Early York the best early potatoes, not excepting the famous Early Rose. The Early Rose is a week earlier, but is not to our taste as fine a flavored potato as the Early York. With us the Harrison is a poor potato, and is not as good as the Peach Blow.

Our opinion is that the hills of Jefferson county cannot be excelled, north or south, for a fine table potato. I have had potatoes from Iowa, Wisconsin and Michigan, but never tasted as fine flavored potatoes as we raise here.

Our vineyard of two acres bore a small crop of grapes this season. This is our first year's experience with grape growing. We must confess we like to work among other small fruits better. We cultivated and summer-pruned, as did other vineyardists in the neighborhood. Our vineyard is on a northwestern slope; were troubled but little with the rot.

We planted a half-acre of white beans, mostly between the rows of blackberries, as our potatoes did not finish out the middle of the

rows. Planted this crop 23d of June, and pulled them 24th of September. All the cultivation we gave them was running through twice with a cultivator. The yield will probably be eight bushels.

We expect to make potatoes a specialty, connected with small fruits. It is a crop easily raised, and is a great benefit to young growing trees and shrubs. Then it is a paying crop at fifty cents per bushel net, though they do not pay that price this year. We do not intend to stop growing potatoes because they are cheap this year, but renew our vigor another season. They will hardly be so abundant again for several years.

Some of our peach trees did not make as fine growth as they would have done had they not been planted among corn. The trees that were among the strawberries and blackberries made more than double the growth than the trees among the corn. In hoeing the strawberries, we occasionally piled purslain about the roots, which seemed to be a powerful stimulant to the growing of the tree. Any person walking through the strawberry patch would notice the difference at once. Another season we shall pile all the purslain we have about the roots of the peach trees. What has become of all the peach borers? Have not discovered a single one about my trees. Perhaps our insect enemies are going to let us alone for a while. What will become of Mr. Riley and Dr. Hull?

The expense of hired labor, besides our own work, has been but a little over one hundred dollars. In the spring we employed three men until the planting was done, after which the labor of one hand and myself kept everything in good running order. We kept our plants, trees and vegetables clean and in good growing condition simply by cultivating everything at the proper time, not waiting till the weeds were up above the plants, but destroying them as soon as they came through the ground. This ought always to be done in every kind of a crop. Allow the weeds to get a start, the crop, no matter what it is, is stunted, and has received a check in its growth from which it will never recover, no matter how clean the cultivator may make it afterwards.

Many a farmer has lost a fine crop of corn because he was too penurious to hire a little extra labor, that he might do his plowing in season; to be sure, he was thinking to do it himself in good season, but alas! the weeds soon got a start, and checked the growth of what might have been a fine field of corn if he had hired say five or six days labor, which would cost perhaps six or seven dollars.

Our land is all second and third year (except one or two acres of new land), or has been cultivated two and three years, and as a consequence was very rooty and full of stumps. It seemed as though the sprouts would grow a foot a day. We cut them off as many as seven or eight times. Have heard it said that to cut down the sprouts in August they would never come again, but do not believe it. We

cut all through August and they came up in September, but the growth they made did not amount to anything. This was our first year among the roots and stumps, and it often seemed discouraging, but a little perseverance will overcome many little obstacles, as also large ones.

ST. LOUIS AGRICULTURAL AND MECHANICAL ASSOCIATION.

ST. LOUIS, February 1, 1870.

CHAS. W. MURTFELDT,

Secretary State Board of Agriculture:

DEAR SIR:—In compliance with your request, I herewith send a short statistical account of the St. Louis Fair, which may be of some interest to the people of our State.

In 1855 some prominent and enterprising gentlemen of this city conceived the project of establishing a popular annual fair, which, on account of the central position of St. Louis in a rich and rapidly growing country, could not fail to attract great attention, and command the industrial patronage of the people of many States.

Application was at once made to the State Legislature for a charter and such other special legislation as was necessary to incorporate the St. Louis Agricultural and Mechanical Association.

The Legislature at once enacted the necessary laws, the Association was soon organized, and since 1856 (with the exception of a few years during the rebellion) the Association has been successful in getting up the most popular fairs in the whole country.

Their grounds were selected with much care, and fortunately in a most desirable locality. They are situated on the west side of Grand Avenue, and in a northwesterly portion of the city. They embrace about eighty acres of land, which is most beautiful in its general character.

The relation which the grounds sustain to Grand Avenue is of very great concern to their importance.

It is well known that Grand Avenue is a wide street encircling the entire city, and it has long been the design of the city council to improve it in such a manner as to make it the finest city thoroughfare in the world—the Boulevards of the western continent. That design has more recently met the favorable and decided consideration of our

city council, and will no doubt be considered to the full extent of public improvements in the most attractive and desirable manner. This will add vastly to the importance of the St. Louis Fair Grounds.

The grounds are improved in the most tasty manner. They are thickly set with blue grass, and studded with beautiful trees, most of which are natives of the primitive forests that once occupied the lands. Those which have been transplanted are of choice varieties of evergreens, ornamental trees and shrubs, enhancing greatly the beauty of the general appearance.

Meandering walks, well improved, and handsomely bordered drives are laid out in every direction, while here and there ornamental fountains send forth, in ceaseless flow, their cooling waters. The rustic or grotto work and flower beds, which occupy a portion of the south side of the grounds, form a very centre of attraction. This beautiful little improvement never ceases to be an object of curiosity and admiration to all who visit the grounds.

BUILDINGS.

The spacious amphitheatre, by far the largest in the United States will seat, comfortably, 12,000 people, giving to each a view of the arena and the exhibitions within the same. There are also two promenades, each of which hold 12,000 persons. Thus it will be seen that this immense structure will shelter as many as 36,000 people, and yet, at the last fair, it has proven insufficient. Thousands of visitors could not be accommodated. Hence, the Board of Directors have determined to erect a new amphitheatre one-half size larger than the present one. Under the present amphitheatre are 85 booths, at which visitors can be furnished with refreshments at all times.

The arena of the amphitheatre is 250 feet in diameter, in the centre, of which is the pagoda, designed for committees and a music stand, around which all the fine stock is exhibited. The pagoda is 45 feet high, has three stories, and is built in the most ornamental style.

The *Floral*, *Mechanical*, *Fine Art*, *Textile Fabric and Mineral Halls* are each and all well adapted to the exhibition of such articles as may be shown in those departments.

The new *Mechanical Hall*, built of brick, has the shape of a *Maltese Cross*, with two wings, one running from north to south, the other from east to west. There is a rotunda in the centre, 75 feet high and 48 feet in diameter. The hall has 48 windows, each 5 by 12 feet. The rotunda has 16 windows, giving light to all parts of the house. This building was erected during the summer of 1868, at a cost of about $21,000.

The *Machinery Hall*, also erected of brick, is 62 feet wide by 250 feet long, and 25 feet high, is well supplied with shafting and pullies; it has two boilers and a 75 horse power engine. This hall was erected in 1868, at a cost of about $19,000.

The Model Cottage, of a neat architectural design, contains four saloons, which are well furnished for the comfort and convenience of the lady visitors.

During a period of thirteen years, through which the association has existed, it has spent several hundred thousand dollars to beautify and improve these grounds, and in annual premiums, instead of dividing large dividends as many have *falsely imagined*. Nor is it a corporation made up of a few speculating stockholders. The facts are quite otherwise.

The capital stock of the association is $82,000, and is held by 659 persons. The association has *never declared any dividend*, but has applied all its money to the improvements of the ground from year to year, and intends to continue to do so.

Many persons have apprehended that the St. Louis fair was also the State Fair of the State of Missouri. This is not the case. This fair is metropolitan in its character, and receives no aid from the State. Its popularity and success arises alone from the advantages of its location and the energy and enterprise of the Board of Directors and officers of the association.

There is not a mercantile house in St. Louis of any character that is not directly interested in its success. A large number of mechanics and merchants of St. Louis are active participators every year, either as *exhibitors, judges or stockholders.*

Every industrial interest, both in our city and surrounding country, is most favorably represented by the best men from the varied fields of industry.

In this way the St. Louis fair is an enterprise in which the whole people are interested, both directly and indirectly. Every year since the organization of the association, its managers have, with the greatest liberality, spent from $18,000 to $25,000 in premiums, and in 1869, the premium list was increased to $30,000. All this money has gone to encourage the farmer to raise fine hogs, cattle, sheep, horses and crops; also, to encourage the mechanics, and, in short, industry in every honorable pursuit of life.

NUMBER OF ENTRIES IN THE VARIOUS DEPARTMENTS IN THE YEAR 1869.

Agricultural Department	537	entries.
Machinery Department	193	"
Mechanical Department	569	"
Products of field and garden, food, etc	576	"
Cotton raised in the State of Missouri	27	bales.
Cotton raised in any of the Southern States	131	"
Fruits and flowers	349	entries.
Fine Arts Department	590	"
Textile fabrics and materials	861	"
Geological, Mineral and Chemical Department	193	"

Poultry	177	"
Sheep	125	"
Swine	296	"
Cattle	241	"
Mules, jacks and jennets	108	"
Horses	893	"
Total	5,866	"

The large departments of the Association have proven too small for the display of the numerous goods exhibited; the Textile Fabric department and Art Gallery were over-crowded, and many fine specimens were not seen by the public for want of sufficient room.

To overcome all these obstacles, the Board of Directors determined, at their meeting, to enlarge some of the departments, and, wherever necessary, to build new and suitable structures.

Very respectfully,

G. O. KALB, *Secretary.*

Board of Directors and Officers of the St. Louis Agricultural and Mechanical Association for the year 1870:

DIRECTORS.

Arthur B. Barrett,
G. B. Allen,
John J. O'Fallon,
E. A. Manny,
E. C. Lackland,
David Clarkson,
D. K. Ferguson,
Jeff. K. Clark,
James S. Farrar,
Samuel A. Hatch,
B. M. Chambers,
Henry Clay Hart,
Charles Speck.

OFFICERS.

Arthur B. Barret, President.
G. B. Allen, 1st Vice President.
E. A. Manny, 2d Vice President.
Henry Clay Hart, 3d Vice President.
G. O. Kalb, Secretary.
B. M. Chambers, Treasurer.
Wm. M. Lindsay, Superintendent Fair Grounds.

EVENING AT THE FARM.

BY J. T. TROWBRIDGE.

Over the hill the farm-boy goes,
His shadow lengthens along the land,
A giant staff in his giant hand;
In the poplar tree, above the spring,
The katydid begins to sing.
The early dews are falling—
Into the stone-heap darts the mink;
The swallows skim the river's brink;
And home to the woodland fly the crows,
When over the hill the farm-boy goes,
Cheerily calling,
"Co,' boss! co', boss! co'! co'! co'!"
Farther, farther, over the hill,
Faintly calling, calling still,
"Co', boss! co', boss! co'! co!"

Into the yard the farmer goes,
With grateful heart at the close of day;
Harness and chain are hung away;
In the wagon-shed stand yoke and plow.
The straw's in the stack, the hay in the mow,
The cooling dews are falling—
The friendly sheep his welcome bleat,
The pigs come grunting to his feet,
And the whinnying mare her master knows,
When into the yard the farmer goes,
His cattle calling—
"Co', boss! co', boss! co'! co'! co'!"
While still the cow-boy, far away,
Goes seeking those that have gone astray—
"Co', boss! co', boss! co'! co'!"

Now to her task the milkmaid goes,
The cattle come crowding through the gate,
Lowing, pushing, little and great;

About the troughs, by the farm-yard pump,
The frolicksome yearlings frisk and jump,
While the pleasant dews are falling—
The new milch heifer is quick and shy,
But the old cows wait with a tranquil eye,
And the white stream into the bright pail flows,
When to her task the milkmaid goes,
Soothing, calling,
"So, boss! so, boss! so! so! so!"
The cheerful milkmaid takes her stool,
And sits and milks in the twilight cool,
Saying, "So, so, boss! so! so!"

To supper at last the farmer goes,
The apples are pared, the paper read,
The stories are told, then all to bed.
Without, the cricket's ceaseless song
Makes shrill the silence, all night long.
The heavy dews are falling—
The housewife's hand has turned the lock,
Drowsily ticks the kitchen clock.
The household sinks to deep repose,
But still in sleep the farm-boy goes,
Singing, calling,
"Co', boss! co', boss! co'! co'! co'!"
And oft the milkmaid in her dreams.
Drums in the pail with the flashing streams,
Murmuring, "So, boss! so! so!"

THE DAIRY.

A Paper read before the Hickory Grove Farmers' Club, by Chas. W. Mortfeldt.

It is one of the peculiar characteristics of the American people that they are impatient of results. If they construct a railroad, or enter into any joint stock operation whatever, even to the establishment of a cheese dairy, they want to be able to declare a dividend within six months at farthest. I believe that my hearers to-night form no exception to the rule. Remember that to patient, persevering toil success is sure.

It is not always safe for a farmer to confine himself to a specialty; many have risked their all on a single crop and failed. But if there is in all the wide range of farming, including the specialities of fruit culture, a single branch of which it may be proper to make a specialty, it is dairying; and by this we by no means imply that the laws of supply and demand do not govern dairy products as well as any other commodity.

Allow me for a few moments to compare one or two of the common branches of farming with that of dairying; and, first, the raising of grain. The farmer who cultivates winter wheat, rye or barley, will wait patiently for the long year to roll round before his grain will mature and can be carried to market. It wastes, with the most careful, by every handling, by seeding, by harvesting, by threshing, and last though not least, by marketing. Here the waste, as far as the farmer is concerned, generally stops. We will not be digressing very far in considering the result to state, first, that his very impatience leads him to cultivate the varieties of grain which are calculated to bring the speediest returns; and, secondly, let us consider this practice as to the farm itself. In every sack of wheat, in every load of barley, is carried away just so much of the farm, viz., of the fertile mineral constituents which give it value.

In a little work called "The Chemistry of the Farm and of the Sea," we read: "If we make a chemical examination of wheat, we find that what we are able to rub off from the kernels, after moistening, with a coarse towel, is made up of woody fibre, and differs but little from the dry straw of the plant." (Bear in mind, if you please, that there are some nutritive qualities in the straw itself, and also that curious substance which, though mineral and really *flint*, is yet soluble, and in that form is silica or silicic acid in its purity, and forms the glossy coating of the straw. Lands deficient in this cannot produce heavy, well-matured crops of small grain.) "The next wrapper, which is a continuous one, contains the most important constituents of the seed, holding the phosphate salts and the nitrogenous ingredients. Here is stored up in little atoms the phosphate of lime, magnesia, soda and potassa, which the microscopic mouths of the root fibres have sucked from the soil in which it grew. The office of the plant has been simply one of transference; it has transferred from the soil the earthy particles, lifted them from their low estate to the highest within its power to attain, placed them in position to meet the requirements of men and animals."

This conclusively proves my position that the grain-raising farmer literally carries off his farm in every load of grain he sells; consequently his lands are empoverished by this process from year to year, until at the end of a decade or score of years, he considers his farm worn out and intending to move westward to new lands; he advertises his lands as under "*a high state of cultivation*," and for sale. "God save the mark!" He judges correctly of what his lands *ought*

to be, considering the time he has occupied them, but states facts contrary to truth. He is not likely to deceive a western farmer!

But to retrace our steps, compare the stock-raiser with the dairyman. I refer now to the man who raises cattle or swine for the shambles: If neat cattle are his specialty, he waits patiently three, four or five years, according to the various breeds of cattle, before they are mature and ready for the market.

If he raises hogs, he must wait a year and over before he can realize. Very frequently the peculiar trait first referred to will stimulate farmers to sell steers or swine, especially the first, to the drover a year before they are fully matured, and during which period the feeder's profits would be much larger than at any previous time. Impatient of results, he sells at three years old what he should keep until four or five years old, but "he must realize immediately." It is no unfrequent occurrence that the steers reared in Missouri, or Kansas, or in the Indian Nation, are driven into Illinois and there fattened another year, and often they are fed still another year in Ohio or New York. This would not be the case if western farmers understood their true interests.

But, Mr. President, I proposed to compare the dairyman's condition with that of the grain-raiser or stock-breeder. The dairyman's harvest comes twice a day, night and morning. Under his system most of his lands are in grass and clover, the least exhausting of all crops (unless allowed to mature seed). His cattle tread his pastures and furnish the top dressing for them and his meadows. When he breaks his sward (for he must of necessity raise some grain to feed to his stock), his lands are as good as new every time. He has it in his power to so manure his land that he can reasonable expect large crops of grain, and he alone can keep up a regular system of rotation of crops. Under such a system of farming his lands improve from year to year, and he will not be likely to move. Should the spirit of adventure impel him to such a step, he will find ready buyers for his farm, and obtain a good price for his *improvements*.

IMPORTATION OF BUTTER AND CHEESE.

Every careful observer must be astonished at the amount of dairy products every year imported into Missouri. This, instead of lessening as the State is settling up, is every year increasing. Look, if you please, at the signs of our dealers: "New York butter," the real "Gilt edge," "Ohio butter," "Ohio factory cheese," "English dairy cheese," "Rock river butter, a No. 1." Who ever saw a sign "Missouri cheese," or "St. Charles county butter?" No one, I will venture to say, or, if one, it will only be the exception.

It would certainly be very interesting, as well as instructive, were it possible to ascertain the exact amount paid by St. Louis alone for imported butter and cheese. The other cities of our State are equally dependent upon the imported product, perhaps not in the

same proportion, because nearly all are surrounded by an agricultural population, who furnish a good share of the butter consumed in their limits. I know that St. Louis receives a good deal of butter that is sold directly from the producer to the consumer, of which no one but the parties immediately interested take cognizance. I myself have visited St. Louis annually for twelve successive years, and sold sometimes as high as three tons of butter, the product of my own and neighboring dairies, generally directly to the consumer.

As to its profitableness, allow me to say that any one who can furnish a number one article of butter, and who will patiently and perseveringly look up his customers, can find, to-day, in the city of St. Louis alone, five thousand families who will agree to pay (let me name a moderate price) forty cents per pound, the year round, for all they may need as a table supply.

Why should the farmers of Missouri, especially those living near the largest city in the State or adjacent to a railroad line leading thereto, allow their brethren of Illinois or Ohio, or the still more distant New Yorkers, to fill their pockets with "the greenbacks" which ought to make plethoric their own wallets? Can we not raise as nutritious grasses, as sweet clover, as sound corn, as those farmers east of us? Who will dare to say we cannot?

It is a very common error, of which I myself have been guilty, that the dairy region of these United States is confined to a strip of land lying between the parallels of forty and forty-three degrees. That this territory is well adapted to dairying is no more certain than that first-rate butter can be produced in Jefferson, Crawford or Jasper counties, Missouri. Only introduce the grasses and the requisite skill, and you can produce number one gilt edge butter. I know this, for I have tested that which was produced there. It will, no doubt, be necessary to introduce a somewhat different management, especially as to the time of cows becoming fresh, and to have suitable and convenient springs of water, etc., but with these the thing is comparatively easy, even more so than farther north. This as to butter, while in the production of cheese it would be still easier.

A BUTTER DAIRY.

In any pursuit of life theory without practice amounts to nothing; nor can we look for a correct practice where we have a false theory. Both should be correct and go together, and to these we should add *common sense*. We must have a clear conception of what we desire to accomplish, a correct theory *how* to do it, and the requisite skill to carry out our theory, and the common sense to adapt our practice to incidental and ever varying circumstances. A chemist may try a series of experiments with various and different matter or agents; now, if by a certain combination he can so manipulate his matter as to produce a sure and invariable result, then he has *a scientific fact*; science is only another word for knowledge.

I very much doubt whether we shall ever have much science in agriculture; that is, compared with mathematical science, because many of our experiments are naturally dependent upon circumstances and natural forces and agencies beyond our control. Hence, it would be folly for any man to assert that he, with a *certainty*, could grow a crop of wheat, corn or oats, or any other crop, dependent upon sunshine and rain, and exposed to ravages of insects, droughth or excess of rain, or untimely frosts. But by the light of experience, having a correct theory, and the necessary art or practice, we can, by the addition of common sense, generally arrive at satisfactory results with tolerable certainty.

What I shall say to you at this time on the subject of dairying, while containing a few scientific and universally admitted facts, is mainly the result of a practical farm life of nearly 25 years. Allow me to say, that as a dairyman my success is in a great measure due to the patient and persevering skill of that hand which was placed in mine at the altar, when we promised "to love and cherish each other." *She* has been and is still, I am happy to say, a true helpmate to me. God bless her! If you are curious to know something of my public success as a dairyman, allow me to refer you to the transactions of the Illinois State Agricultural Society.

Dairying is not the hardest of farm labor, yet it has its hard features; one of which perhaps the hardest is that *it is very confining*, if you follow it, you must be on hand at "*milking time.*" In a well regulated dairy, the hours for milking are morning and evening, and should divide the day (twenty-four hours) as near as may be into two equal halves; thus the harvest of the dairyman comes twice a day, as already intimated. It comes too in the pleasantest part of the day for the labor, namely: in the cool of the day for all the outdoor work, while the indoor work can be done in the shade and during the hot weather in the coolest part of the house, viz: the cellar or the spring house.

Before entering upon the detail of butter-making, allow me to glance at the other branches of dairying. Where milk can be sold in its natural state, (without water or chalk) that is undoubtedly the most profitable. It is not very likely that we could obtain a statement as to profits of the proprietors of the "Mt. Cabana" dairy, near St. Louis, nor of any of the other large dairies near the city. They vary in keeping from one hundred to four hundred cows, and so completely have they a monopoly of the milk trade, that to my knowledge, (and I have made some inquiry) not a single can of milk enters St. Louis by any of the different railroad trains. While in Chicago, a "milk train" arrives every morning over the leading roads, and "*Elgin*" milk, drawn from cows fifty miles away, is made the standard in that city as to purity and quality. What is to hinder St. Charles and Warren counties from furnishing at least half the milk and cream consumed in St. Louis?

But, Mr. President, I learn that my friends present here to-night are about to establish a cheese dairy. The thoughts that I offer here to night are intended for the annual report of the State Board of Agriculture. The last report (1868) contains some valuable hints as to the best mode of manufacture and profitableness of cheese, I will confine myself to butter. Allow me to reiterate what I have stated, that by most people, cheese is esteemed a luxury rather than a necessity, and that it is no business for a tyro or novice to undertake to make it on the factory plan. If you intend to make cheese by all means get a man of large experience to superintend it, or make calculations for small dividends—if not actual losses.

Now, if you please, follow me into detail:

We will suppose the time of year to be the month of June, and the time of day to be after six P. M. We have a dairy, say of twelve cows, and there are two or three milkers. The pails, bright tin, or well-scoured patent buckets, having been well scalded, and being thoroughly sweet, are taken in hand, and we go out to the yard.—Every milker milks the same cows, always, if at all practicable; his or her hands should be clean, and, if possible, *not hard*; if a field-hand must necessarily do some of the milking, a washing of the hands in warm water—not so much for the immediate cleansing, although that is indispensable, as for the softening of the hands—is a great help. Always treat your cows gently. Lose not your temper under any provocation. Remember you are dealing with a dumb brute, which you can, by patience, educate to be gentle and tractable; or, by opposite treatment, to be contrary, ill-natured, and, as far as profit goes, "*of no account.*" Let your milking be done easily as to motion, taking one back and one forward teat, because it is easiest for your hands—*and be sure to milk perfectly clean.* Avoid unnecessary conversation, because, being at some distance from the other milkers, and the operation of milking naturally making some noise, you must stop frequently to enquire what is said, when your correspondent, in turn, stops to listen to your remarks. The *stopping* is to be avoided rather than the *conversation.* If you incline to hum a cheerful tune, and your cows are accustomed to your temper, it is not objectionable. It is also recommended to milk your cows in the same order, though this is not essential, unless you have a cow which *will not wait.* I have known such. Our pails being full, we carry the contents to the milk room or cellar and strain *immediately* into the pans, each holding from six to ten quarts. (They should never be over three-fourths full.) We use for this a strainer pail, and also an independent strainer. These utensils must, of course, be well cleansed and scalded each time they are used. In the first washing, the use of soap is recommended—fatty substances cannot well be removed without—next use pure water, and scald well after that. The practice of setting pans and pails out into the sunshine, is a good one. *Let it be understood that absolute cleanliness is necessary to success.*

From what has been said, it will readily be inferred that I intend to confine my remarks to the art of making butter.

Milk and cream want air, though the immediate current of a strong breeze is to be avoided, as it tends to make the cream hard and leathery; milk-pans are made flaring to secure this object. In the spring or fall, or whenever practicable, according to the weather, the milk is placed in a milk room, and in very warm days in the cellar —both if practicable, constructed with a northern or eastern exposure. These should be kept perfectly clean and sweet, free from all vegetables, fresh meats or other odors—and to effect which there is nothing more efficient than whitewash or lime—because there is nothing more easily affected by such foreign odors than milk, cream or butter; both milk-room and cellar should be fitted *for*, and used *only*, for their legitimate purpose, except a short time in winter. The temperature of these rooms should be between sixty and seventy degrees; if it gets much higher there is a waste, the milk souring before all the cream is thrown up; if less, it takes a longer time than is necessary for the cream to rise, and injuriously affects the quality. In from thirty to thirty-six hours the milk may be skimmed. The cream is put into a large cream pan, also widest at the top, and every time new cream is added the contents are gently stirred. No cream should be added if churning is to be done within four hours, because it needs that time to ripen or to become thoroughly incorporated, and even tempered with the mass. False cream is formed by adding cream just before churning, and always attended by waste. When churned, the cream should be at a temperature of sixty-two degrees. The use of a good thermometer is very necessary. If your cream is too cold, hot water—not scalding—may be added; but if the cream is too warm, cold water or ice may be used, moving the dash of the churn gently at the time. If your animals have been properly salted, once or twice a week, the butter will come in about twenty-five or thirty minutes. I would not have it produced in less time than twenty minutes, if I could; that time is required, in my opinion, to obtain *all* the butter your cream contains. Butter consists of fine globules of oily or fatty matter, which must have time to form perfectly, and which should not be broken. "Agitators," and such like churns, which keep up a strong motion, are to be avoided for reasons just indicated. A churn promising to make butter in five minutes would not recommend itself to me on that account.

When your butter is come, and well gathered by a few easy strokes of the dasher, draw off your butter-milk, pour in a pailful of cold water and move your dasher a few times, this will quickly separate the butter-milk; if not done to your satisfaction, repeat and perfect the separation by hand and ladle. Here is one of the great points of adding the *keeping qualities* of your butter, viz: *perfect separation of the butter-milk.* If you undertake to effect this by the use of the ladle alone, without water, your butter will be worked too

much, the small globules broken, and your butter becomes salvy and greasy, and can never be classed as No. 1. Twenty years practice, and considerable success, have confirmed me in this opinion. I question if there is in all Delaware and Herkimer counties, N. Y., a single family of the contrary opinion. The color of the water used in washing your butter will indicate when your work is well done. Another important point is the salting: Nearly an ounce of the best of "Liverpool" blown; or if that cannot be had, of ground "solar" salt to a pound of butter, is probably nearest right. By a little attention, and one or two actual weighings, you can come at the quantity necessary for each churning by measurement. Have your bowl or tray and ladle well scalded, so that neither salt or butter will stick to them; spread your butter well and evenly, and partially work in your salt; cover well, and set in a cool place; let it stand from four to six hours, then work it over with the ladle, (some use the hands; I do not recommend that,) and thoroughly incorporate the salt; pour off the little brine that has formed, and pack away. The color of this brine will also tell you whether the product has been well purged of the buttermilk.

It is not necessary to make a brine to cover your butter. A little brine, say from a pint to one quart to the firkin, will form, any way, and this should not be expelled by over working.

A few words as to cooperage: Oak and ash firkins of uniform size, free from worm holes or sap in the staves are best. They should be well soaked before using; this is best done by pouring boiling hot water into the same and allowing it to cool, if filled full of hay first it is all the better; after that scour well with brush and soap, because coopers heat the staves, and often blacken them; give another scalding and then they are ready to receive your butter.

In packing, sprinkle a single handful of dairy salt at the bottom, and make even layers of each churning—pack as solid as possible. As you proceed, rub the sides with a little salt, so as to make the butter cleave from the sides. Color in butter is a great point. It should be uniform and natural—not artificial. If, for some reason, there is a variation, keep such a churning for the family or immediate sales. Always have the family supply on hand before you commence filling a firkin, then fill as fast as possible, remembering, that while *milk and cream want air, butter must be kept from the air*, for when exposed it rapidly deteriorates. A double cloth, with the addition of the open head, will be sufficient while you are filling your package. Never cut out of the firkin for family supply or sale, if it is at all to be avoided. Fill within half an inch of full, spread on a clean white cloth, free from starch, cover this with a half-inch layer of salt, and head up tight. Remember this: if a farmer wishes to sell his wool to the best advantage, he turns out the shoulders of his fleeces, and not the tag locks; so with your packages—they should be neat and tidy, which speaks well for the contents, and invites inspection.

To the tryer, a number one article of butter will be of uniform color, not salt to the taste, crisp, cleaving from the knife, and sweet as a rose. For such an article you can demand the highest market price—often more, and always find a ready market. There is never an over stock of this quality of butter.

In a dairy of six or more cows, it is necessary to churn every day, always excepting the Sabbath, in order to honor which it may be necessary to churn twice on Saturday. It is best, in large dairies, to make only two or three sales. Summer is a poor time to move butter; families purchase only for immediate use; autumn or early winter, when a supply of from four to six months is needed and purchased by every family which is able, is the best time to sell. Butter made at such times, or later, may be sold to good advantage in "Welsh" tubs, pails, or even rolls.

It will now be readily understood that to enter upon the business under consideration some necessary preparation should be made; a good, cool, well-ventilated cellar and milk room, if possible with a northern frontage, a good and handy supply of pure water, the utensils, a proper arrangement of pastures, water convenient and of ready access to the cattle, and above all to the cows themselves, are, of course, absolutely necessary.

THE HONEY-BEE AND ITS GAINS DAY BY DAY.

BY A. E. TRABUE, HANNIBAL, MO.

We have occasional calls through the agricultural press and otherwise, to know whether bee-keeping in Missouri is profitable, and also as to the best management to make it so. One enthusiastic gentleman, desiring to make bee-keeping a specialty, and not having the means to ride, walked over 130 miles from the interior of the State to visit this apiary, arriving yesterday.

Not having time to answer as to management, for this would require a volume, I may be allowed to say, in a word, that to succeed in bee-keeping requires a love for the business almost equal to the love and enthusiasm of this gentleman, and that hardly anything else will do.

In the meantime, in compliance with yours of December 27th, I take pleasure in furnishing the following record by return mail:

I have never believed that success in anything could be achieved at haphazard, and without knowledge, and more especially is this true of farming and bee-keeping. There are any number of guesses and reckons about both, but there is nothing like a reliable pair of balance scales, and the thing recorded day by day. In applying this test to farming and feeding stock, I find the best informed of nearly all our agricultural writers on some points are greatly in error, especially as to the value, for instance, of cooked feed.

But to the present subject. I find, as a rule, that Italians store from 50 to 100 per cent. more honey than the common bee.

There is a family of farmers in the upper end of this county, who are natural born bee-keepers, and have always had bees and honey while their neighbors have been running out of both.

Some seasons ago I furnished one of them an Italian swarm for experiment, rather against his wishes, for he is much opposed to innovation.

He had some stands of common bees. He noticed the Italians worked earlier and later, and stored more honey, and increased 100 per cent. The blacks did not increase so much. Next season he had thus two Italian and twenty stands of common bees. The difference this time was more marked: the two Italians increased to thirteen, and the twenty blacks to only twenty-three stands.

The blacks of his brother increased only ten per cent., while the Italians increased 300 per cent. The difference in the honey-gathering capacity of the two races is not so marked, though greatly in favor of the Italian, because of their greater energy and longer proboscis, enabling them to reach the nectars of many flowers that are inaccessible to the common bee.

It is, then, important to have the Italian bee, if we want complete success, This is imperative.

In the Agricultural Report for Missouri last year, we gave the increase, by weeks, of an average Italian swarm during the years 1867 and 1868. The net increase in the former being 87 pounds, counting the gains of the two swarms that came from it, and of the latter 100 pounds net—it not being allowed to swarm.

This year I put a medium colony of Italians in a large hive, which weighed, including frames, comb, honey board, extra honey receptacles, etc., 59 pounds. The bees and honey weighed 22 pounds—thus the hive, bees, honey, etc., weighed 81 pounds.

The intelligent bee-keeper will require no persuasion to study the following record:

1869, May 1, 81 pounds, gross. Cherry trees in bloom.
2, 81½ "
3, 83 " Apple trees in bloom.
4, 84 "
5, 84¼ "
6, 86 "

	8,	90½	pounds. Weather warm and genial.
	9,	90½	"
	10,	92½	" Weather warm again.
	11,	92	" Heavy rains.
	12,	91½	" Heavy rains; apples out of bloom; first bloom of Thornless Black Cap raspberry.
	13,	91½	" Still wet.
	14,	91½	" "
	15,	92½	" First Doolittle and wild black raspberry in bloom.
	16,	92	"
	17,	92	"
	18,	91	"
	19,	91	"
	20,	91	" Cold rain all day.
	21,	90½	" Cold rain all day; first bloom of Rutland raspberry.
	22,	91½	"
	23,	91½	" First bloom of white clover, no honey in it.
	24,	92½	" Kirtland and Doolittle raspberry, and black locust trees in full bloom; first blossom of Philadelphia; no honey yet in white clover, and but little in black locust.
	25,	94½	"
	26,	95½	" Two inches rain.
	27,	96½	" Honey locust in bloom and honey in it, also a little honey in white clover.
	28,	96½	" Damp.
	29,	96½	" Damp.
	31,	95½	" Black locust out of bloom.
June	1,	96½	" Warm and clear.
	2,	97⅛	" Warm and clear; bees gathering honey and bee bread from red clover.
	3,	101½	" Clinton, Taylor and wild grapes in bloom.
	4,	102	" Honey dew on oak leaves.
	5,	103½	" Cool; 50° Fahr. an hour after sunrise.
	6,	103½	" " " " " "
	7,	103	" "
	8,	105½	" Honey in white clover for the first time.
	9,	106½	"
	10,	108½	"
	11,	108½	"
	12,	108½	" Thornless Black Cap ripe; rain to-day.
13 to	16,	108½	"
	17,	105½	" Kirtland ripe; five inches rain; some honey in white clover again.
	18,	108½	" Working freely on white and red clover.
19 to	27,	108½	" Philadelphia raspberry plenty and ripe.
	28,	112	"

29 to 30, 112 pounds.
July 1, 112 "
2, 113¾ " Clear and warm.
3, 113¾ "
4, 116 "
5, 117¼ "
6 to 9, 117¼ "
10, 118¾ "
15, 117½ "
20, 115½ "
24, 118½ "
30, 121½ "

During August, because of unfavorable weather, they scarcely gained or lost. I omit the dreary record.

September 3d, 129¼ pounds. Yellow bastard Spanish needles in bloom,

September 4th, 132½ pounds.
" 5th, 137½ "
" 6th, 162 "
" 7th, 144½ "
" 8th, 147¾ "
" 9th, 150½ "
" 10th, 155 " Rain; warm.
" 11th, 157 "
" 14th, 156 "

They gradually and slowly declined from this date until the 8th of October, when they weighed 153 pounds. I then broke them up and prepared them for winter quarters.

Put about 125 Italian swarms in a bee house built this fall on the top of the ground. The outer walls are of plank and the inner wall of the same, three feet distant, and the space between stuffed with straw—four or five feet of straw on top and boards on top of that. The inside diameter of the house is fourteen feet, and the walls three feet thick. The doorway is stuffed with straw and blankets.

A thermometer on the end of a long pole penetrates through the straw into the center of the room, by withdrawing which the inside temperature may be known at any time.

It is not satisfactory. There is so much ventilation through the top and walls that the thermometer varies almost as rapidly inside as it does out. Owing to the peculiar winter, some that I have in the ground are doing much better.

If we were having such a winter as the last, the case would be reversed.

I wish to put on record a remarkable circumstance that happened last fall.

About the 1st of September a hive cast a swarm. They settled on a limb of an oak in the horse-lot adjoining the public road.

They were beautiful Italians, but considering they could not make enough honey to winter, and the limb was a large one, forty feet from the ground, I concluded to let them go. I would have returned them to their own hive, had I known from which colony they emigrated.

Two days after I was warned that the bees were swarming again, and on investigation I found it was this identical swarm, which had remained clustered forty-eight hours, and were proceeding to find more comfortable quarters.

They explored around for an hour or two, and finally returned to the same limb and clustered again. There was no other limb within ten feet of them, and here they remained three or four weeks.

In about two weeks, in the middle of the day, I could see a honey comb of a golden yellow, protruding below the cluster. This comb must have been eight or ten inches long and wide. I saw them last about the 1st of October.

About a week afterwards I concluded they had done so well I would hive them; but on proceeding to the locality, I regretted to find they were gone, and nearly all the honey and comb gone too.

Their location was about eight feet from the body of the tree, exposed to the North and West winds, and to every mischievous boy that passed, which finally, I suppose, caused their destruction.

I think this has not happened before in the experience of any one, and proves a decided exception to the rule that bees will not remain clustered on a limb more than twenty-four hours.

THE HONEY EMPTYING MACHINE, (Or Melextrastor.)

BY W. G. CHURCH, MEXICO, MO.

It has been known to most intelligent bee-keepers for years, that bees consume a large amount of honey and time in producing the wax from which their combs are built, though doubtless there are many that are neither aware of the expense of the comb or the process by which the wax is formed.

Wax is a secretion of the honey bee—as leaf lard is of the hog—and exudes from under the rings of the abdomen in thin, semi-transparent scales, about the thirty-second of an inch in diameter, which

are united together by the heat of the cluster of bees to form the cells.

To produce this secretion, "idleness and indulgence" seem to be absolutely necessary, and when comb-building commences, a large part of the colony cease operations, eat large quantities of honey and hang lazily in large festoons in the hive, where they remain very quiet until the wax is secreted, when it is taken away by other bees and placed in the required position, being rendered soft and pliable by the heat of the cluster.

Those who have given the subject the closest attention, estimate that from twenty to thirty pounds of honey are consumed to produce one pound of comb. If we allow that one-half the bees in a colony engage in comb-building—which is a low estimate—that will, of course, reduce the working force one-half, and make the actual loss from forty to sixty pounds of honey for every pound of comb produced.

Estimating the honey at twenty-five cents per pound, and we see that the comb is actually worth from ten to fifteen dollars a pound; and then when we remember that ordinary hives contain from three to five pounds of comb, we can easily see what we lose by being obliged to destroy the comb in order to obtain the honey.

After pondering these facts for a brief period, the bee keeper will be prepared to hail with joy any plan by which this lavish expenditure may be saved, and bee keeping rendered more than doubly profitable.

In the first edition of his "Mysteries of bee keeping," Mr. Quinby urges the necessity of changing the comb occasionally to avoid dwarfing the bees, by the accumulating cocoons in the cells reducing their size, and consequently the size of the bees hatched in them. In later editions, however, he abandons the position, having been forced to do so by unmistakable evidence to the contrary, having examined he says, "hives that had been occupied for twelve years without changing the comb, and found the bees as large and healthy as any." Acting upon Mr. Quinby's original idea several hives were gotten up, so arranged as to force the bees to renew their comb once or twice a year; but happily this absurd idea was forced to give way to reason and experience, and the great anxiety for some time has been for some plan by which this great waste might be avoided.

Several attempts were made to furnish hives with artificial comb, but without success, and for once, at last, Yankee ingenuity was at fault, while it remained for Major Van Krushka, of Segnano, in Italy, to conceive the idea of constructing a machine for extracting the honey from the comb without injuring the cells, so that the combs might be again returned to the bees.

When the machine was first announced, it success was doubted by many who thought the means were too simple to accomplish so desirable an end; but notwithstanding all doubts, it has won its way

into public favor, and does all and even more than was claimed for it by the inventor.

The following description of the machine, by the inventor, is taken from Adair's "Annals of Bee Culture:"

"The whole matter is very simple, and reminds one of the 'egg of Columbus,' and is founded upon the use of *centrifugal jarre*. You can convince yourself very easily of this, by trying the experiment on a small scale. Take a pipe cover, place a piece of uncovered honey comb into it, tie a string to it, swing it around in horizontal circles, and you will see that honey is emptied out of the comb very easily.

"Founded upon this idea, I have constructed an apparatus which gives the most satisfactory results, and offers many advantages to those obtaining honey in large quantities, and among these advantages are *purity of the honey*, *celerity* in gaining it, and *intact preservation* of the cell-structure, which is frequently so very valuable to the apiarian.

"To give a general idea of this machine, imagine to yourself a horizontal disk, put in rotary motion by a wheel; upon the edge of the disk are eight perpendicular parts, surrounded or connected by a wire screen, and thus forming an octagon on the disk. If now you hang the uncovered combs with their frames upon the post on the inner side of this wire octagon, and put the disk in motion, so as to make about six revolutions per second, the combs will be emptied in one or two minutes.

"The honey is caught in a circular tub surrounding the disk and drawn off at the bottom.

"With such a machine a laborer can easily empty in a day from eight to ten hundred weight previously uncovered comb, and the combs are emptied so thoroughly, by continuing the rotary motion long enough that they appear perfectly dry."

The first account of the machine was published in the fall or winter of 1867, and during the season of 1868, it was tested by several persons in different parts of the United States, and although in many cases the machines were very rudely constructed, yet in every case heard from, they proved a decided success.

During that and the succeeding seasons many improvements were made, rendering the machine much more effective and easy to manage, as also more readily cleaned, and less liable to get out of order.

Mr. Root, of Medina, Ohio, after describing in the Bee *Journal* a machine made by himself, says: "with our lady assistant we emptied, weighed and sealed up, 285 pounds of honey, in about three-fourths of a day."

Farther on he says: "we poured our honey into a large jar with strainer attached, and it is then drawn out by a faucet into the self-sealing pint jars as they stood on a pair of scales, so that it is quickly and accurately weighed."

Later in the season, writing to the Medina *Gazette*, he says: "In the spring we selected a strong stock, with a very prolific queen, and first removed every bit of drone comb from the breeding apartment, and supplied its place with clean straight frames of worker comb; second, we arranged the second story, as it was a Langstroth hive, so as to hold frames above as well as below; third, the honey was removed by the machine at intervals, of from three days to a week, or just before the bees were about to seal it up; fourth, as the swarm soon became very populous, we were several times obliged to remove the comb from the centre and supply its place with empty frames, to prevent their clustering out and "loafing," so that they have in reality built several frames of comb besides yielding us 203 pounds of pure honey up to this date, July 21, and from appearances we think they *are not near through yet.*"

"Of course all our stocks have not done equally as well, yet we think we could have them do so with the same treatment.

From twenty stocks in the spring, some of which were quite weak, we have taken just 1,000 pounds of honey and increased our number to forty stocks, or an average of fifty pounds of honey and one swarm for each.

At the Michigan Bee Keepers' Convention, held at Jackson, Michigan, September 29, 1869, Mr. Marvin said: "This machine would pay for itself if only used with a single hive for a single season."

Mr. Rood said: "No one can appreciate its value until he tries it; no apiarian can afford to do without it, as the saving from the repeated use of comb is immense. The quality of the honey is much better than when obtained by straining."

Mr. Baldridge said: "I can remove one hundred pounds per hour; have taken from a single hive, the present season, 175 lbs. of liquid honey, and forty pounds of box honey."

R. R. Murphy, of Fulton, Illinois, writing to the *Bee Journal*, says: "I used the honey machine on one hive, and got 218 pounds of honey, as follows:

July 7th	16½ pounds.
July 28th	6 pounds.
August 14th	27½ pounds.
August 21st	35¾ pounds.
August 27th	34 pounds.
September 6th	33 pounds.
September 11th	28½ pounds.
September 21st	37 pounds.
Total	218 pounds.

And I could have obtained more if I had used the machine oftener. I would not be without the honey machine for three times what it cost."

Mr. J. M. Robnette, of Centralia, Illinois, writing to me Nov. 8,

1869, says: "With the machine I got of you at the St. Louis Fair, I emptied about fifty pounds of honey, and took it to St. Louis with my box honey, and sold it for *five cents a pound more* than the box honey."

Mr. Wolf, of Jefferson, Wisconsin, in the *Bee Journal*, says: "It fully answers the purpose intended. I confidently expect, by the use of this machine, to increase my honey crop three fold next year. I have emptied both old comb and new to my entire satisfaction, and without damaging either."

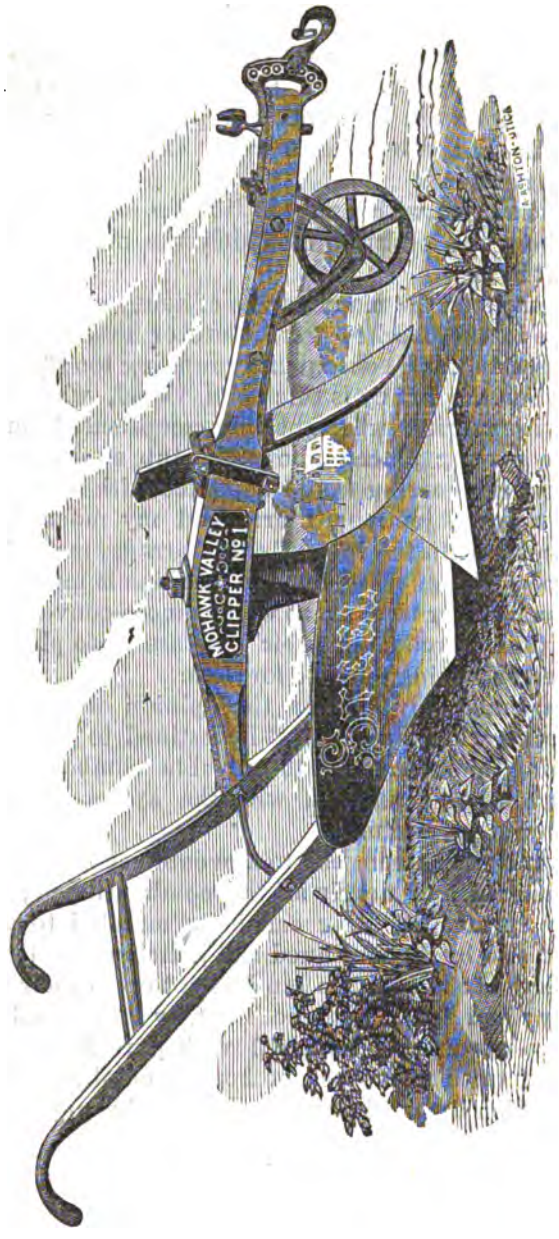
Pages might be filled with extracts like the foregoing, but these are enough to show the estimate in which the machine is held by those who have it in use.

When I commenced the manufacture of honey emptiers last season, I found those in the market were more or less objectionable; some having no gearing, and consequently running too slow to accomplish the work when the honey is thick and viscid, while those that were provided with gearing were not only complicated and expensive, but had the gearing placed above the tub so that any dirt or grease falling from the gearing would be mixed with the honey.

To obviate these objections, I arranged my machines so as to place the gear underneath the tub. By this arrangement, I not only get rid of the dirt of the gearing, but the machine is much simplified and rendered much easier to clean as well as more convenient to use, and at the same time so reducing their expense as to place them in reach of every person having any use for them.

I am satisfied that I only express the opinion of every one that has tested its merits, when I say that it is destined to work a revolution in bee keeping, and that next to movable comb hives, it is the most valuable invention connected with the apiary, that has been made during the present century.

By its use, transferring from box to moveable comb hives is much more readily managed, and nearly all the comb utilized; by its use during the early spring, breeding can be stimulated to an almost unlimited extent, and by its continued and judicious use through the season, the strength of the colonies can be kept up to their maximum without difficulty; and last, though not least, by its general introduction we shall have our market supplied with pure honey instead of the conglomerated trash composed of honey, comb, bee bread and dead bees, with which the market is now so largely supplied.



"MOHAWK VALLEY CLIPPER PLOW." (First Premium Breaking Plow, entered by F. T. Woodford, Utica, N. Y.—See page 63.)

THE OBJECTS OF PLOUGHING.

Prof. Way discovered that soils not only possess the power of separating ammonia, but likewise other bases from their solutions, and they hold them, after being absorbed, with great tenacity. Thus one hundred grains of clay soil taken from the plastic clay formation of England absorbed one hundred and fifty grains of potash from a solution of caustic potash containing one per cent. of the alkali. It is interesting to observe that the liquid was not in this case filtered through the soil, but only left in contact with the cold solution for twelve hours. Prof. Way has further shown that soils have the ability to separate the alkaline bases from the acids with which they are combined. He found that when saline solutions were slowly filtered through soils five or six inches deep, the liquids which passed through were deprived from their alkaline bases, as potash, soda, ammonia and magnesia, and only the acids were to be found in combination with some other base. Thus when muriate of ammonia was filtered through the soil, the ammonia was removed, and a corresponding quantity of lime, in combination with muriatic acid, was found in the filtered liquid. In the same way sulphate of potash was deprived of its base, and the liquid collected gave sulphate of lime on an analysis.

Prof. Liebig has attempted to show that in this power of soils, which enables them thus to attract manurial substances from their solutions is analagous to that by which charcoal separates coloring matters and odoriferous matters from their combinations. This is known to be partially mechanical and partly chemical.

The chemical force like that which causes the solution of substances in water is very weak; it attracts substances itself, but does not produce any change whatever upon the character of the substance. The coloring of the odorous is in contact with the pores of the charcoal just as coloring matters adhere to the fibres of cotton or wool, quite unchanged in their nature. Neither powder pit-coal nor the hard, glossy charcoal from sugar or blood has much power to attract coloring matter from their solutions, while porous blood or bone charcoal possesses the property in a very high degree; and among wood charcoals, those which have the greatest amount of capillary porosity.

It is just so with soils, those which have the greatest amount of capillary porosity will condense a greater amount of manurial substances on their internal surfaces; will retain them longer against the adverse solvent action of water, and will give them out most readily to the rootlets of the growing plant. A mass of adhesive clay will absorb but a very slight amount of available manure; but if this mass is rendered friable by mechanical processes, its power of absorption is amazingly increased. In view of what has been stated, it is very clear that ploughing land increases its porosity by pulverization.—[*Selected.*

VAN WYCK'S SWEET SIBERIAN CRAB APPLE.—*Rural New Yorker.*

NEW FRUITS.

A NEW SWEET CRAB APPLE.

At a recent meeting of the New York Fruit Growers' Club, a Miss Van Wyck from near Fishkill, New York, exhibited five varieties of seedling crab apples. These seedlings had been reared in this wise: The old crab trees upon the old Van Wyck domain had dropped their fruit, the seed of which had germinated, and the young trees resulting had been carefully transplanted and cultivated. The fruit exhibited was from these seedlings. Among them was one notable for its beauty, size, and sweetness. It was as handsome as a finely colored pear, with a delicate bloom upon it like a plum. It had the appearance of a crab and yet it was as sweet as honey. The question recurred to every one who saw and tasted it, "Is it a crab?" If it is, it must be of great value, not so much to the East, perhaps, but to the extreme Northwest, where this class of apples alone, with one or two exceptions, succeeds. The hope expressed in these columns by Mr. Elliott, early in the present year, that time and experiment might, "in a few years, produce for us varieties of this crab class which shall equal if not surpass the best varieties of the apple now known," seems much nearer realization than was then supposed. So far as we are aware, this is the only sweet crab in the country.

Is it a crab? Following his professional instinct as the entomologist does who tears the bark from dead trees the day long for a bug, Mr. Fuller posted off at once to see the tree and answer this question. He reported, "No mistake about it." He sent specimens of it to Charles Downing, who also visited the tree the next day, and asserts there is no question about it. From Mr. Downing we have the following note and description of the fruit, which, with the illustration herewith presented, formally introduces this fruit to the pomological world:

EDS. RURAL NEW-YORKER: I send you, as requested, a description of Van Wyck's Sweet Siberian Crab. Very truly,

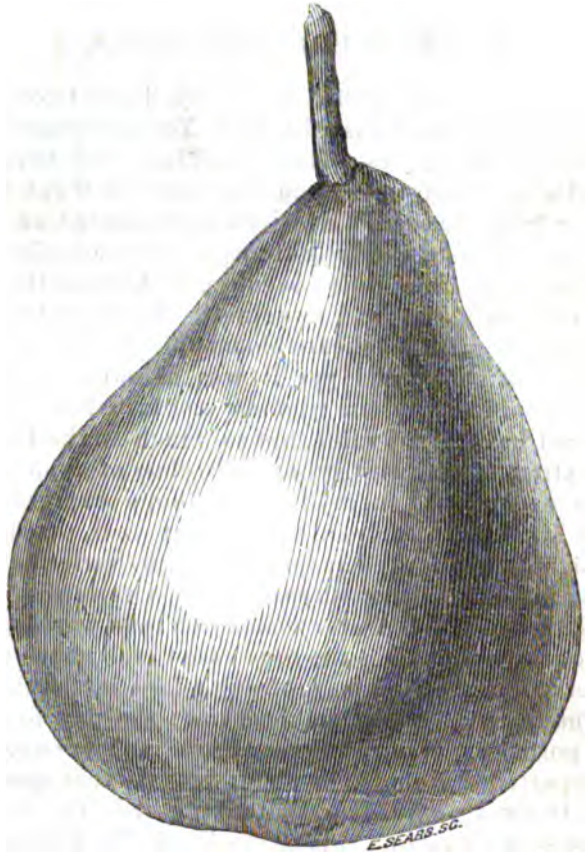
CHAS. DOWNING.

DESCRIPTION.

Fruit large for a Siberian, or about an inch and a half in diameter, roundish, slightly conic, regular; skin whitish, shaded, and mot-

tled with light red; stalks an inch long, slender, inserted in a narrow, smooth cavity; calyx small, closed; segments short, closed; basin round, open, very slightly corrugated; flesh whittish, fine, rather firm, moderately juicy, with a honeyed sweet flavor, quite rich; core small and close.—*Rural New-Yorker.*

THE PATER NOSTER PEAR.



The Pater Noster was catalogued by Van Mons in 1823, and is therefore comparatively an old pear. It is sometimes sent out under the name of Paul Shielens, to which it is superior in quality, although somewhat resembling it in appearance. The description of the fruit is as follows: Size, large; form variable from obovate obtuse pyriform to irregular obovate acute pyriform; skin greenish yellow, mottled and shaded in the sun with red, netted, patched and dotted with russet brown; stalks stout, usually planted with a lip; basin shallow; flesh white, juicy, melting, slightly vinous. Good to very good. October to November.—*Rural New-Yorker.*

MINERAL WEALTH OF MISSOURI.

TWO LECTURES

DELIVERED IN THE HALL OF REPRESENTATIVES, JEFFERSON CITY, MO., FEBRUARY 17TH AND 18TH, 1870, IN ACCORDANCE WITH HOUSE RESOLUTIONS.

I. Mines and Mining Education. II. Coal and Iron.

BY PROFESSOR C. D. WILBER,

INSPECTOR OF MINING LANDS.

WITH AN APPENDIX.

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I.—MINES AND MINING EDUCATION.

The interest with which minerals and mineral wealth are regarded is universal. A man is only a walking cabinet of minerals—a microcosm of metalloids. Besides definite proportions of phosphates, carbonates, nitrates, hydrates and oxides, what is he? Chemically considered, Adam was 35 pounds of phosphate of lime, distributed through 5 pails of water; while Eve required for her corporeal existence only 25 pounds, with 4 pails of water.

"Dust thou art, and unto dust shalt thou return." This law distributes him to the sources whence he came, gathers up and restores the fragments or atoms, so that nothing is lost. The earth is our mother, and the eagerness with which we listen to her revelations, is it not inborn?

We will further say that in proportion as we recede from barbarism and advance towards civilization, our progress is marked by the discovery of minerals, the increased production of mines, and by frequent discovery of new uses of metals. Gold, Silver, Copper, Lead, Tin, and Iron—these are the pavements on which humanity marches onward—and the golden streets of the New Jerusalem are only the earnests of industrial progress continued and enjoyed forever!

With this acknowledged connection between men and minerals, let us trace some of the metallic veins up through human history, and we shall see that our zeal for metals—whether coarse or precious, most civilized, as we claim to be—is far greater than the ancients ever possessed.

While they worship metalic images we worship the precious metal itself, not atheistic nor idolatrous, but as unqualified trinitarians—devotees, acceptable and orthodox, of the American trinity—the golden eagle, the silver dollar, and the copper cent. And it is the force of this religion in us that will draw us back to a specie basis in spite of all the recommendations of the Forty-first Congress.

The rudest tribes of mankind have neither ideas nor uses of metals. The Boshman, Caffre, or Hottentot, appreciates a cowry above a piece of silver or gold. A Cheyenne or Apache Indian prefers a flint to a ruby, and swine prefer artichokes to pearls.

In earlier times we find the use of silver most prevalent. It was currency, or money. For the purchase of Hebron, Abraham weighed the price in silver, "current money with the merchants" Of gold and silver large quantities were used for ornaments of the person, and the adornment of temples; also for ransoms, tributes, and taxes. Sums or weights of silver and gold are noted which indicate that the mining industry of the Egyptian, Assyrian, Persian, Jewish, Grecian, and Roman empires was co-extensive with their greatness. The city of Damascus paid a tribute of 2,300 talents of silver to Babylon (a talent is $2,000 nearly), and according to Pliny, Cyrus obtained £7,720,000,000 from the conquest of Asia. From Herodotus we learn that the yearly tribute paid to the Persians was 3,000,000 lbs in silver. During 50 years Carthage paid as tribute to Rome 9,000 lbs, Troy, of silver. Caligula ornamented the armor and weapons for his grand circus or coliseum with 124,000 lbs. of silver.

The ancients obtained metals from many localities. Eschylus describes the mines of Larium as "the fountains of the silver treasure of the earth." The modes of obtaining ores, or mining, and the methods of reducing them, were the rudest sort. They were simple, involving little or no cost, and calculated to waste more than they saved.

Diodorus says that the shepherds on the Pyrenees mountains set fire to the forests, causing the silver in the rocks to melt and run down in numerous streams.

The Carthagenians employed 40,000 men to work the Spanish mines, and the Moors, their successors, continued the work; but so wastefully was it performed, that a German colony of miners, in 1571, took out $20,000,000 of silver from the refuse of former workings.

German mining began as early as the seventh century. The Bohemian silver mines were opened in the tenth century, and the Tyrolese mines in the twelfth century. Bohemia gave laws and methods of mining, and developed a spirit of enterprise spreading north and west throughout Europe. As a consequence, the mines of England, France, Hungary and Norway were opened.

The discovery of America was a new era in the history of mining, particularly on account of the vast wealth which poured into Europe from South America and Mexico.

The Peruvians had no fixtures or machines, or knowledge of mining. They smelted surface ores and such as could be found above water. Their furnaces were scooped out of hill or mountain side, and the smelting flames were dependent upon the winds.

We cannot estimate the amount of silver thus obtained. The soldiers of Pizarro found, not far from Cuzco, three beams of silver, each twenty feet long, one foot in width, and three inches thick; probably bench planks for the portico of a nobleman's residence. Atahualpa's ransom, in gold and silver ornaments, contributed by his loving subjects, was valued at £3,500,000 of gold, and 25,805 lbs. Troy of silver.

The Pasco mines were discovered in 1680, and were worked without any order or system, except systematized cruelty. One day a portion of the mine caved in, and killed three hundred miners. The mine was named "Kill People," or Matagenti, afterwards. The amount of silver smelted at these works, from 1784 to 1827, was 4,967,710 pounds Troy.

Bolivia contains mines still richer than those of Peru. "Potosi," or Silver Mountain, discovered in 1545, has yielded £240,000,000 worth of silver, or £1,200,000,000.

The mines of Peru and Bolivia, under circumstances most discouraging, "of wars and rumors of wars," have yielded 155,839,180 pounds Troy of silver.

Humboldt estimates the annual yield of the mines of Mexico, during their early period, at $2,000,000 to $23,000,000 per annum. In the eighteenth century the production was increased to 23,000,000 per annum.

The gold and silver crop of California, since 1846, exceeds one thousand millions of dollars! and this we may consider as the mere *out-crop*.

The obstacles which everywhere opposed mining—shafting, drifting, gangue-cutting, flooding, etc., etc., led to the invention of machinery, based upon the study of mechanics and hydraulics. As necessity is the mother of invention, so mining industry has given us the engines that now perform nine-tenths of all labor. The steam engine was called into existence by the irrepressible will of miners, to force water out of the Cornish mines.

It was indeed a great triumph for a Watt engine to lift 5,590,000 pounds of water one foot, by using one bushel of coal.

Smeaton increased the duty of an engine to 9,459,000 pounds. In 1776, engines could raise 19,000,000 pounds one foot, with one bushel, of coal.

In 1823 an engine raised 28,000,000 pounds. In 1843, 60,000,000 pounds. Austen's engine, eighty inch cylinder, raised 96,000,000 pounds. So perfect and powerful are these engines now, that a farthing worth of coal will raise 2¼ tons of water 600 feet.

The mining districts of England alone, produced this grand result and contributed the steam engine to the world's industry.

The locomotive—so deservedly popular in this country—was an after-thought, and at first only an automaton truck-wagon to move the increased products of mines worked by engines. But so numerous has this new born race of coal consumers become, that we are now obliged to seek and work coal in every land in order to procure fuel or food to maintain them.

Two thousand locomotives going to and fro, night and day, in the Mississippi Valley—consuming one ton of coal for every forty miles of transit, added to these three times the number of stationary engines, equally voracious—this *fact* bears strongly upon the import-

ance of coal mining in our country. So great is the annual consumption of coal that we are already estimating the amount we have on hand, or rather in *bank* to meet both present and future demands. Already are we seeking to know *how* and *where* it is distributed and *how long* it will last.

The answer is quite encouraging. From the Alleghenies, Pennsylvania, Ohio, and Virginia; from Illinois, Iowa, Indiana, Kentucky, and Missouri, comes the assurance, not with figures of rhetoric, but of arithmetic, that we have for all these purposes enough to last 700,000 years!—beyond which limit we have no anxious care!

In the States and Territories west of the Mississippi River there is still a deep concern upon the question of fuel. It is not yet settled as regards the plains of Kansas, Nebraska, Colorado and the Indian Territory.

The headlights of another thousand locomotives will soon illumine those plains, long ago dedicated to desolation, and named by our fathers, the Great American Desert.

To welcome these missionaries of peace and prosperity, and lying in the way of every railroad to the Pacific, is the great Colorado coal-field.

It reaches from the British possessions into Mexico, 1200 miles; and is in many places 120 miles in width, and contains five workable beds of coal from five to twenty feet thick. It is the largest and most valuable deposit of coal in the world.

It will supply for ages all the homes of herdsmen upon the plains who will utilize or occupy every acre of that tenantless domain—[a better land to-day than the country of Abraham, Isaac, and Jacob—and far better than John Chinaman ever knew.]

It will form and fashion, spin and weave, utensils and fabrics for the coming millions that will there seek and find prosperous homes.

Based upon mining industry, the country west of the Mississippi—the Western States—will, in less than half century, exhibit a reign of prosperity unequalled in the history of the race.

> "Westward the star of empire takes its way.
> The first four acts, already passed,
> The fifth shall usher in the glorious day:
> Time's noblest empire is the last."

But let us look within the borders of Missouri—a State so attractive to capital that the national Capitol has begun to march hither; and be assured that it will arrive on time! No State has been so highly favored with mineral wealth. Although little explored, comparatively, yet it has attained and will maintain the *first* place as the source of minerals and metallic ores, and the day is not far off when the manufactured products of her mining industry will give her a like position. With her own hands she shall obtain riches more valuable than her inheritance.

It is, *par excellence*, "the *Iron* State." Pilot Knob is only a symbol, and is rising higher and higher in the world's estimation.

We extract from Dr. Litton's description:

"The quantity of pure iron ore at the Pilot Knob is not, probably, less than all that portion of the mountain above the elevation of 440 feet above its base; for, beneath this point, there are large masses above the base of the hill. A section of the Pilot Knob, 440 feet above, and parallel with its base, would cover an area of not less than fifty-three acres. Considering the upper 141 feet as composed entirely of iron ore, and as a cone, with base of fifty-three acres, it would make 108,507,960 cubic feet of iron ore; which volume, if water, would weigh 6,760,045,900 pounds. The specific gravity of three different specimens of the Pilot Knob ore was found to be 4.75, 4.49, and 4.66, the mean of which is 4.63; and taking the last as the average specific weight of the ore, it would give, for the total weight of the ore, upon the above supposition, in the upper 141 feet of the Pilot Knob, 31,299,012,554 pounds, or 13,972,773 tons."

It is probably the head of the king bolt, binding the two hemispheres together!

"From surface indications, and from all explorations made, the whole Iron Mountain seems to be a mass of iron ore. The elevation of its summit above the valley varies according to the point at which the measurement is made; and, from the survey of the railroad, I take for its height, 228 feet; and at this depth, below its summit, its base cannot cover a smaller area than 500 acres. Considered as a cone, with a base of 500 acres, and a height of 228 feet, the solid contents of that portion *above the surface* is, 1.655,280,000 cubic feet. One cubic foot of water weighs 16.3 pounds, avoirdupois; and were this mass water, its total weight would be 103,123,944,000 pounds. But the determination of the specific gravity of two specimens of the ore has shown that it is between 5.05 and 5.23 times heavier than water. Considering it, however, as only five times heavier, it would give for the total weight of the iron ore, above the surface, 1,515,619,720,000 pounds, or 230,187,375 tons."

In the vicinity there are other mountains, mounds, hills and dykes of iron. In fifteen counties of south-eastern Missouri are dykes and knobs of the purest specular and hermatite ores, and in quatities which defy exhaustion.

Take a few analyses:

1st. From an iron mountain in Dent county, a few miles from the Southwestern Pacific Railroad, and 120 miles from St. Louis, belonging to Judge Simmons:

Metallic iron	68.87, Weiss.
" "	69.81, Beauregard.
Mass	98.23, Weiss.
"	97,00, Beauregard.

Two specimens from near Rolla, Phelps county, Missouri, contains as follows:

No. 1:		
Hematite ore	64.00	metallic iron.
	27.43	oxygen.
	.64	water.
	6.20	insoluble silica.
	.02	phosphorous.
	98.29	
No. 2:	63.72	metallic iron.
	27.31	oxygen.
	5.80	insoluble silica.
	1.69	water.
	.03	phosphorous.
	98 55	Brock, Philada.

The ores of England, Wales and Scotland are, as a class, far inferior to these, yielding from 28 to 46 per cent. metallic ore.

Across the Mississippi river—the city of St. Louis between—are strata of coal of correspounding magnitude. Within fifty miles of St. Louis there is coal sufficient in quantity, and well adapted as to quality, to smelt every ton of iron above described.

The bands of matrimony between these two loving subjects—Coal and Iron—have been declared, and St. Lonis—the home of the bride—is their chosen residence. The bridegroom is black, but comely, and I move that the privilege of the Fifteenth Amendment be extended to them.

Iron is the most valuable of the metals, because it is the most useful. It is also the most widely distributed, no part of the earth being without it. In the mechanic arts it is the right hand, and, indeed, has furnished to every man a hundred hands, so that in modern days a person can be Vulcan and Briareus at the same time. It combines a thousand uses, and has a vast residue latent, which will be easily evoked by the dextrous cunning of men. It does anything, everything! It serves anywhere, everywhere! Let a person name, if he can, any implement, or article of food or clothing, that has not been fashioned with iron fingers.

We walk upon iron pavements, and sit upon iron chairs; we live in iron houses, and sleep upon iron beds, made soft with springs of steel; we attend an iron church and occupy iron pews, listen to a sermon written upon iron paper with a pen of iron, and return to our own hearths and firesides: we travel on iron roads, in cars made of iron, drawn by iron steeds.

On the trackless ocean an iron needle points out the way, like an unerring finger. With iron wands, weird and wired, we have annihilated Time and Space, and made of all nations one neighborhood. And lastly, with iron ships, we have revolutionized the whole art of modern warfare, and fought and won the greatest battles of history!

Lead, Zinc, Tin, Copper, and many minerals useful in every day life are here in force, but we can describe them neither fairly nor fully, on account of the incompleteness of reports. The State has done nothing to ascertain of what account or extent they are during the past ten years. These examinations have been left to capitalists and adventurers, who are continually being enriched, and are indifferent in regard to making reports. Lead is being mined in the southwestern and middle counties of Missouri in large quantities, and proves to be the best article in market, and commanding ½ to ¼ cent. per pound advance.

At one establishment in Jasper county 33,000 pounds of mineral are smelted daily, yielding 22,000 pounds pure lead. The per cent. of lead is 71 to 75.

It has been found in twenty counties of southwestern Missouri and in more than five hundred localities, in an area of 6,000 square miles.

At Granby, in Newton county, the lead comes to the very surface of the ground, and mining at this point has been successful beyond precedent. The lead is found in somewhat regular leads, or pockets, or disseminated through the bed of chert, clay, sand, and limestone, partially cemented, which overlies the Mountain limestone. The sulphuret of lead, or galena, is the most abundant ore. Pure galena contains 13.34 per cent. of sulphur and 86.66 per cent. of lead. The Center Creek and Turkey Creek mines in Jasper county, and also the mines at Newtonia, Newton county, are being worked successfully. The statistics of one shaft will give an idea of the quantity of ore raised and the profits of mining in this county, being 100,000 pounds of galena per month. In one week alone it yielded 50,000 pounds, which, at $20 per thousand, would amount to $1,000; deduct $150 for expenses, and the profits alone were $850 for the week; they will average $1,500 per month. Hundreds of shafts have been sunk and are yielding similar profits. The amount of mineral smelted in this county last year was 10,000,000 pounds.

The coal fields of Missouri—though not yet determined—are ample, and for the most part of excellent quality. The largest of them is the Chariton coal field, extending north and south 150 miles on both sides of the Chariton river, from Iowa to the Missouri river. It has an average width of 30 miles. It contains four beds of coal, all within 150 feet of the surface, the lower vein bearing 4½ feet thickness.

There is also a considerable distribution of coals in southwestern Missouri, especially in that portion known as the prairie counties. These coals are uniformly good, but are not persistent either as to thickness or direction. The railroads now in construction extend across the coal as well as lead districts.

Will our coals work our ores; especially iron ores? We answer yes. They are put here for that purpose, and we may suspect our

ignorance rather than question the arrangements of the Creator. The Germans make iron and steel by the use of coke, made from poorer coals than can be found in Missouri. The great beds of cannel coal, found in Callaway, Howard, and Boone counties, are from 10 to 40 feet in thickness, and have an area of 1,500 square miles. They are so rich in oil that every ton will yield 80 gallons of crude oil, at a cost not exceeding 10 cents per gallon. The iron retort, and a carboy of sulphuric acid constitute the necessary apparatus for producing refined oil. These coals will be distilled for this purpose at no distant date.

The flowing wells of Pennsylvania—those impertinent spouts—are the principal hindrance at present; but they are short lived: have patience.

On the rim of an argent shield, the coat of one of the States, is this motto: "Si queris amœnam peninsulam, circumspice." Let us translate it thus: If you are seeking a wonderful land, look around you. Like Canaan beyond Jordan, it is indeed a goodly land. "A land of brooks, of water, of fountains, and depths that spring out of valleys and hills. A land of wheat and barley, and vines and fig trees, and pomegranates. A land of oil, olive, and honey. A land wherein thou shalt eat bread without scarceness; thou shalt not lack anything in it. A land whose *stones* are iron, and out of whose hills thou mayest dig brass."

In the light of these facts or first lessons, the duty, or rather the privilege of the commonwealth of Missouri is unmistakable. If you would invite the Capital and Labor of both hemispheres, send to them a correct inventory of your goods: send them at least a well printed bill of fare, that they may know somewhat of the feast you have ready.

In short, have your State thoroughly and systematically explored by competent men—men of practical as well as scientific ability—and whose record of discovery, description, and analysis are vouchers for their capacity. There are men living in Missouri who can do this work. A State that claims such men as Litton, Engleman, Shepard, and Shumard, need not look abroad. If others were needed, the labors of such men as Meek, Newbury, Lesquereux and Whittlesey can be commanded.

The best endeavor of the people should be directed to have and maintain a survey of the entire State, conducted with special reference to the development of its staple mineral values; describing not only the topography and drainage, and giving the areas of arable land in each county, with analysis of soils, but also the extent and direction of each rock formation, with an inventory of its particular values, whether of metals and mineral ores, or coals, clays, cement, building stone, marble, mineral paints; but including also a descriptive catalogue of fossils—those types of life, or rather illumined letters in the

history of world-building, which enable us to read the well ordered chapters of the Stony Book.

The munificence displayed by Divine Beneficence in this State can be best appreciated by giving according as you have received. Give the information which millions are seeking. Write the thousand facts about these mineral treasures in a book and send it away. It will be more marvellous than the story of Alladin's lamp, more interesting than all the novels of Dickens and Thackeray, and will command the attention of the men that control the world's Commerce and Manufactures. And when the State of Missouri shall number two millions of inhabitants, say ten years hence, and a knowledge of her mineral wealth shall have become familiar to all, what shall hinder thousands of her citizens from choosing some particular branch of mining industry, whose united results will be referred to with just pride by your citizens? "Where no vision is, the people perish." Let us delve and mine, measure and analyze, and run to and fro in the land, until we have greatly increased this knowledge and made it available for the men of skill and industry who, from all countries, are seeking homes within the borders of Missouri.

These remarks lead us naturally to consider the relations of mining industry to the system of education or Public Instruction.

In Europe these relations are understood. Schools of mining and engineering are provided for by the State, and not only so, but England, France, and Germany have established Mining Bureaus, which direct all surveys under government supervision—having reference, also to the mining schools.

We have, in the United States, done much towards meeting the real wants of the people in this regard, but much yet remains to be done. We have a National Academy of Science and national surveys of mines and mineral values in the Territories.

Mining schools in this country are for the most part individual enterprises, as in New York, Philadelphia, and are generally adjuncts of mining and assay offices.

On the other hand scientific schools are mere departments of our Colleges and Universities, and in most instances are made secondary and inferior to the classical department. But it may be said, we have only a few scientific men who can give weight and worth to such a school.

Start a first class war, and there is no lack of generals; and bravery—the only thing that cannot be discounted for its abundance—comes forth with every emergency. Provide mining and scientific schools and foster them, and we too will raise up such men as Watt, Stevenson, Trevithick, Huxley, Agassiz, Faraday and Humboldt.

No excuse can be plead in our Collegiate institutions for the neglect with which the physical sciences are treated. We do not

complain that preferments and rewards are generally given to excellence in the knowledge of Latin and Greek, for these are only toys to please children with. But we do protest against the blindness which constantly invests the classical student with finer robes, and values his knowledge as belonging to a higher grade—which looks with no little reverence upon a person whose mind is familiar only with the usages of Antiquity, which he has learned by groping with a dim light in the dark chambers of the dead languages.

It will not suffice that he knows all these things—as fact, or a mere matter of record. The translated histories will never do. Rollins, Gibbon, Josephus, and the Scriptures—containing a more truthful panorama of the phenomena of human action—all of this is second class by force of the tyranny which is still vigorous in our Colleges and Universities.

The secret spring of this sentiment, or the basis upon which this aristocracy of learning rests, is unworthy of us, and is an outrage upon the liberties of mankind. When analyzed, it means simply this, that the few who study classics and endure and overcome the difficulties incident to them, shall have extra privileges and be considered of superior rank because of such toil and endurance! It cannot be urged that they know *more*, or have more *thorough* knowledge than those who read the best translations in English, for that is impossible. Shall we crown a youth with "laurel and bay" because he has spent a year in a dark cavern? Because one in ten thousand has interpreted for himself a few of the jargons of Babel and spent a few of his best years in threading the labyrinths of ruins made in the rude ages of human history, is he therefore, "altogether lovely?" Shall we put him upon a white steed and lead him about the streets, proclaiming: "Thus shall it be done unto the man whom the King delighteth to honor?"

But it is and often has been urged that the classics give refinement, culture, and discipline to a degree *beyond all other studies*. We not only doubt this, but know that it is not true, and in the nature of things can NEVER be true.

The literature of the classical course, what is it at best?

It is Mythology, Poetry, and History—in short, descriptions of ancient nationalities, by writers then living. Now, what can be said of all the gods and goddesses of the Pantheon or of Pandemonium, when we know that they never had an existence? Shall we study the myths of Roman and Grecian antiquity, for years, being assured at the same time, that every word of it is false—but that for the sake of discipline and culture we must wade through it?

And not only this, but the story of the gods—their words and deeds—their relations to mankind, and constant interference in human affairs, and shaping of individual and national existence—to say nothing of the vices, big and little, which are attributed to them—with rare exceptions—these, are interesting mainly because they are

revolting, and for this reason are more fit for an illustrated page in the "Day's Doings," or the "Police Gazette," than in the curriculum of a college in the year of our Lord 1870.

We have said that there is some consolation in the reflection that these gods are not gods; that, after patiently plodding through with classical course, we can with the besom of truth, sweep it out, like cobwebs from an untidy room. There was no *such* Jupiter; nor any giant like Hercules. Mercury was *not* such a busy-body—everywhere present. Juno and Venus and Dido—why, they were myths; and the highest success of "Woman's Rights" will not culminate in such characters, and we need not apologize for them.

"But he retains in his mind the vigorous discipline of the course." We doubt it; he may be sharpened as to those faculties most in use—like the point and side of a plow—but his imagination, the picture gallery of the soul, has been impaired by beholding a panorama of false pictures, of unreal things, and the citadel of the soul—the heart, where all that is royal and noble in man resides—this has not been strengthened, but weakened by these false and insufficient methods of instruction. We have come to entertain serious doubts concerning the refining process of a classical education.

Will a seven years' residence on Mount Olympus, or Mount Ida, at Delphos—among the "Gods of Greece"—or Rome, or, still farther, with "Osirus, Orus, Apis, Isis," give us this, the most estimable jewel of the crown?

It requires a year to follow the exploits of Bacchus in the Odes of Horace. [We use the expurgated or washed editions—a second washing would do no harm.] Virgil and Juno conduct the exercises in Virgil, chiefly. Jupiter, Neptune, Vulcan—the strong gods—are seldom seen in comedy, and retreat after putting in an occasional appearance.

In reading the Metamorphoses of Ovid, hold your book to the leaward, not the windward side. And as for most classic orators—Cicero and Demosthenes—every graduate knows that they are full of oaths; as downright swearing and profanity as the lips of men can utter. It is true, it is only "Ma tous Theous!" "by all the gods!" "Mehercle!" "by Hercules—or Jupiter!" or by one god or a dozen, according to the refined taste of classic antiquity.

It was not so very bad in them, because one cannot take Jupiter's name in vain, for he is "*non est inventus*" himself! But familiarity with oaths, orgies and profanity makes it easy to take His name in vain, and *this* is very bad indeed. Think of it as you may, the habit of swearing, akin to that of lying, weakens and shatters the intellect. Oaths and lies are the very worst of all written or spoken words. No person can indulge in either without feeling the indignant lightnings—not very far off.

But let us render unto Cæsar, or the classics, the things that are Cæsar's, and honor to whom honor is due. The doctrine of Homœo-

pathy, "like cures like," is everywhere true. The study of ancient languages gives us facility of expression in the use of our own language, and leads us to the best choice of words. Let it be so. We will use them for this purpose. Study them as aids to our own; use them as a rasp to sharpen our mother tongue—a work which they will accomplish, no matter what they fail to do.

The refinement and culture, we seek for, are not traceable to the study of languages. They come from the manners of our teachers at home, in the school, college, or university. Their source is the daily manifestation of a True Life, compelling our constant respect and reverence by unselfish devotion to us as students; by patiently guiding us to new and better views, and leading us on to new victories and triumphs of mind over matter—of the spirit over the forces of nature. There is no sense of delicacy finer than our feelings towards such teachers. "By this they conquer," and hence we derive the amenities and refinements of academical or even classical education.

Without this personal power of mind over mind, to lift as well as lead; this moral magnetism of self-governed as well as scientific and classical teachers, whose Presence and Being are an unfailing inspiration and encouragement to virtue, our colleges and universities would be to-day but little better than the temporary abodes and theaters for Bacchanalian revels, so minutely described in the precious text-books of the course. Arnold, of Rugby, Horace Mann, Mark Hopkins, Alexander Campbell, Louis Agassiz, Benj. Silliman, Alexander Von Humboldt—what student ever went out from the presence and instruction of such men without knowing, if not realizing, that these premises are absolutely true?

In the great Mississippi Valley—(in which North America is principally situated)—we demand a more ample and practical system of education; and not only so, we will have it!

We will not complain of the last remaining fetters imposed upon us by the aristocracy, which provided for an excess of monastic learning in the colleges of Europe and America. It was the best they knew one hundred years ago; but to-day we know better. Besides, these fetters are crumbling piece-meal—probably from rust. Nor will we complain of the tenacity with which most of our Eastern colleges pursue the study of languages—like their transatlantic progenitors. Moss and mistletoe are not so sacred to us.

The advance made in those institutions towards practical learning within twenty years is indeed wonderful. We do not want all they have; but we want the best they have added to the new demands of the West.

Hence the emphatic decision recently given by the members of this House on this momentous question. That decision is as follows:

We will promote that system of education in Missouri which bears most directly upon the leading interests of the State; or, in still

more definite language, we will have an Agricultural and Mining school, well endowed with lands and funds, and what is better, well manned with competent instructors.

The highest prize for farming and mining? Well done, Missouri. May your broad rivers bear the tiding onward to the Gulf, and the Atlantic, and, mingling the tides and currents, with this news reach and refresh the shores of distant nations, eager to follow your example!

The establishment of an Agricultural College in the State of Missouri, with a Mining School in Southeastern Missouri, is the dawn of a new era in our educational history. It is an expression of the people declaring that we have mining interests in this State, which are not secondary to agriculture, and which require special culture in order to develop them profitably. The forces which have carried forward this scheme, and procured its adoption by the representatives of the people of Missouri, have been collecting and concentrating during the last twenty years; and they spring from a steadily increasing conviction or knowledge that the commonwealth of Missouri is most amply and wonderfully endowed with mineral wealth. Among the wonders of the world—known of both hemispheres, and described in many tongues, are the Iron Mountains of Missouri. There is not a school boy in all the land who does not know something about them, and he will tell you more of Pilot Knob, Iron Mountain, and Shepherd's Mountain than of any other locality celebrated for minerals on the Globe.

The Institution, properly called the School of Mines, declares a determination to know the principles of mining, and to apply the same to productive industry, in order to open new avenues of wealth to our enterprising citizens. Those who attend the institution will be provided with means of instruction in Mineralogy, Geology, Chemistry, Metallurgy or essays, according to those methods which give the most profitable results.

The most useful, and also the most conspicuous of the Mining schools is situated in the center of the richest mining district of Europe—among the Hartz Mountains of Germany, at Freiburg. The instruction, practice, theories, and results of this school are the basis of mining operations wherever skill accompanies intelligence. By its thorough course of discipline—familiar every day companionship with the vast treasuries of ores; the student is constantly challenged to seek out still better modes, leading to the best results.

A traveler has recently described it as follows:

"The Royal Saxon Mining School, now ninety-seven years old, is situated at Freiburg, twenty-five miles southwest of Dresden. It is surrounded for miles by mines, chiefly of lead and silver, that have been worked for six hundred years, and is within two or three miles of two large smelting works. The smelting works near Freiburg,

and some of the mines belong with the school to the government, and the rest of the mines and furnaces are wholly under government control. Students not only visit these mines and furnaces, but work them, the oversight of these establishments being given to the Saxon graduates of the school; constantly employing large numbers of them."

Paris, London, Berlin and other European cities have also their Mining Schools. So we have scientific and polytechnic schools in many of our cities, but in either case it has always been difficult to create and maintain a sufficient degree of enthusiasm to carry the student through the course. It is impossible to concentrate the attention of pupils by mere objects or specimens which are far removed from their source.

A series of samples of Iron ores from Iron county, or of Lead from Potosi or Granby, however much we may be delighted with their brilliancy, have a real interest only in connection with the formations containing them, because with the latter are involved the principal difficulties which require to be overcome.

The study of such formations gives the mind facility, or quickness in judging of the richness or the quality and quantity of the ores therein contained. It is necessary, therefore, both, to study and manipulate ores in the region where they are found. To teach swimming does not require the discussion of theories, or a knowledge of the history of swimmers, but it does require proximity to a body o of water. The State Mining School could not have a better location and we predict for it a successful career.

To sustain such schools and make them easily accessible to the youth of the land, and to place the State under such inspection as we have set forth, requires a large expenditure, and this, with some, will be, at first, an objection; but finally, none will oppose these measures. The State of Pennsylvania may be cited as an example of increased prosperity, brought about by minute surveys of her Coal and Iron fields. Her shipments of coal were:

In 1820	365 tons.
In 1830	174,374 tons.
In 1840	841,584 tons.
In 1850	3,176,537 tons.
In 1860	8,151,569 tons.
In 1870	15,000,000 tons.

The shipments and home use of Iron exhibit a corresponding rate of increase.

Do the taxes on the increased valuation of her mining property pay the expenses of her surveys? Aye, a thousand fold!

In other words, Pennsylvania enjoys an annual income of $100,000,000 from the development of her mines of Iron and Coal, and this

we declare to have been brought about by her thorough public surveys. The State of Missouri affords a larger and richer field than Pennsylvania. Besides it commands 23,000 miles of river navigation, and better than this, her position is the heart of the Empire itself.

One word more. The State of Missouri contains 42,000,000 acres of land, and it may be said generally that every section of this rich domain is supplied or dyked with mineral ores or underlaid with strata of coal. Is it too much to say that the proving of this statement to be true—a most delightful task—and the publishing world-wide of the verified facts, would enhance the value of every one of these 42,000,000 acres by the amount of at least one dollar per acre?

No one can doubt this result, and what constituency would not instruct and urge immediate action?

II—COAL AND IRON.

It is our purpose on this occasion to trace the rise and progress of the Coal and Iron trade from its rude beginnings, in order that we may properly understand its importance and govern ourselves wisely as to our own duty in these premises. A new era has dawned upon the world, and we are its ushers.

It is an era of progress, based upon the uses principally of Coal and Iron. Its climax is in the universal application of steam to the doing of the world's work, in the general departments of Agriculture, Manufactures and Commerce, in order that Man may have opportunity for his highest development. The power which shall bring to pass this grand millennium lies latent in a drop of water, which a grain of Coal will start into such fierce action that the strength and resistance of Iron are required to curb and direct its scarcely awakened energies.

We shall also see from this discourse how abundantly we have been favored with the materials for present and future prosperity, and upon them as a basis we shall anticipate our national progress.

We will not enter upon this history of the riches of the Earth that we may be pleased with its glittering array, but rather that in earnest we may know how to shape our destiny, and discharge the responsibility which this knowledge will bring upon us.

Of the material furnished us for manifold uses, we have chosen Coal and Iron, as affording us illustrations of the prosperity that follows industry directed by intelligence. We find them closely associated in Nature. The great coal fields have large iron deposits near at hand. The State of Pennsylvania, whose coal and iron trade are world-renowned, is a good illustration of this rule.

In the same hill or mountain, over many thousand square miles of that State, one can frequently see coal and iron mining at one view. And in the vast iron marts of England, Scotland and Wales, the smoke of the iron foundry and colliery ascend together and darken the same sky.

In early history no definite mention is made concerning stone or pit coal—distinguishing it from charcoal; and it is not until the thir-

teenth century that coals were mined in a systematic manner. King Henry III. granted a charter, in 1239, to the people of Newcastle-on-Tyne, but the use of this product soon became known in London, whose citizens complained bitterly of coal smoke, and made remonstrances and petitions to have the nuisance abated; and in 1306, in answer to petitions signed by Parliament, King Edward I., "by proclamation, prohybited the burneing of sea-coals in London and the suburbs, to avoid the sulferous smoke and savour of the firing, and commanded all persons to make their fires of wood."

But wood became scarce, the odious "sea-coals" sailed up the Thames again, and found a place upon the king's hearth, twenty years after the veto was proclaimed.

In Germany, coal was worked as early as the tenth century, and in 1348 the metal-workers "were forbidden to poison the air with coal smoke." In Scotland and Wales, coals were used in 1300. It is probable that necessity compelled men to seek for a kind of fuel which could take the place of wood.

Coal was first applied to the manufacture of glass in 1619, and in 1635 King Charles prohibited the importation of foreign glass, setting forth in the royal proclamation that "Sir Robert Mansell had by his industry and great expense perfected that manufacture with sea-coale, or pit-coale, whereby not only the woods and timber of this kingdom are greatly preserved, but the making of all kinds of glass established here, to the saving of much treasure and the employment of great numbers of our people."

This sounds very like an argument in favor of protection; but the English are such valiant free-traders that it is ill-timed to make the suggestion.

Coals were used mainly however, for domestic purposes, and there are no data by which we can ascertain the amount exhumed; but the shipment received at London and the east coast, in 1704, was 647,344 tons, sent from Newcastle and Sunderland. In 1750, from these two ports, the shipment was 1,193,457 tons.

It would be most interesting, but our limits do not permit, to show the impetus given to the coal trade by the discovery of its new uses and applications. The invention of the steam engine, and the demand of coal for steam, in the year 1700; the development of FORCE, instead of HEAT; the use of coal for gas, in 1803—not including the more recent uses—these have called up from the coal treasuries of civilized countries an amount which seems almost incredible.

The introduction of the hot blast in iron furnaces, by Neilson, in 1800, compelled the increased consumption in Europe and America. It was intended to save fuel, but it caused the erection of thousands of new furnaces, and since this period the statistics of the mining of coal are astonishing. We have derived this formula for the history of coal in its applications, "that every advance which tends to

cheapen the productions of manufacture enlarges so widely the field of operations, that coal, the basis of the whole of them, is always demanded in ever-increasing quantity."

In 1829, at the Clyde Iron Works, Scotland, it required eight tons and 125 pounds of coal to make a ton of pig iron. By the hot blast, only five tons, 325 pounds were used for a ton of pig-iron. In 1833, by using raw coal in the furnace, instead of coke, one ton of pig-iron was made with two tons, 550 pounds coal, adding 800 pounds used in heating the blast, gives two tons, thirteen hundred-weight for one ton of Scotch pig-iron.

The increased production of iron was enormous—*i. e.*, in Scotland:

In 1820 it was	20,000 tons.
In 1830 it was	37,500 tons.
In 1839 it was	200,000 tons.
In 1851 it was	775,000 tons.
In 1861 it was	950,000 tons.
In 1864 it was	1,158,000 tons.

The amount of coal used to make 20,000 tons, in 1820, was 161,250 tons, coal; and to make, in 1864, 1,158,000 tons iron, 2,621,671 tons of coal were used, but the saving of fuel, in the latter instance, was 7,000,000 tons of coal, to be credited to the hot blast improvements of Neilson.

The consumption of English coal was:

In 1800	10,000,000 tons.
In 1859	42,000,000 tons.
In 1853	56,550,000 tons.
In 1854	65,661,401 tons.
In 1865	98,000,000 tons.
In 1869	125,000,000 tons.

30,000,000 tons are allowed as the annual waste for the year ending 1869, making the total consumption of coal, or exhaust of the coal fields, 155,000,000 tons yearly.

The United States contains over 275,000 square miles of coal surface—that is, surface beneath which may be found from one to ten stratas, or beds of coal. These great deposits, or basis of coal, are mostly within the Northern States, as the following estimates will show:

The Illinois coal field, including a small portion of Indiana and Kentucky, contains 55,000 square miles. The Missouri and Iowa coal fields occupies 50,000 square miles. This embraces Northern Missouri and Southern Iowa. Michigan possesses 12,000 square miles of coal area. The Eastern or Apalachian coal field is divided, as follows:

Pennsylvania	16,000	square	miles.
Ohio	12,000	"	"
Maryland	500	"	"
Virginia	20,000	"	"
Kentucky	6,000	"	"
Tennessee	4,000	"	"
North Carolina	250	"	"
Alabama	4,000	"	"
Georgia	150	"	"

In addition to these, we must allow for the Kansas coal field, including the Indian Territory, 20,000 square miles; while the great Colorado coal field (Cretaceous) occupies 100,000 square miles.

In comparison with these, let us notice the European coals. The estimates are as follows:

Great Britain contains	12,000	square	miles.
France "	1,719	"	"
Spain "	3,000	"	"
Belgium "	578	"	"

The rates of consumption of foreign coals have led political economists to inquire how long Europe may use her own coals.

"It is evident," says an English writer, "that although our favored country has so long taken the lead, all civilized countries have entered into the race of competition, and it becomes a matter of anxious inquiry to learn under what circumstances the treasure is in each country developed, and where it is likely to be best expended or longest economized."

This question is more fully stated in the same treatise on English coals, as follows:

"Knowing, therefore, most of the edges, and pretty nearly the depth, of all our recognized stores of coal, let us remember at what rate we are digging them out. The amount of coal raised in this country in 1864 shows that, supposing 1,300 tons be obtained per foot thick per acre (out of 1,600 which it actually contains), there are now clearing out, in every hour, day and night, for every day in the year, four acres of coal of two feet thick—one acre in every quarter of an hour! There can here be no reproduction—nothing to grow again. 'We are drawing,' as an able writer has well put it, 'more and more upon a capital which yields no annual interest, but once turned to Light, and Heat, and Force, is gone forever into space.' How fares it with some of our best known districts?

"It seems that in twenty years, ending 1860, the quantity of coal raised in Great Britain was more than doubled; but are we thence justified in believing that in the following twenty years it will be again doubled, and so in geometrical progression?

"On this view of the subject, little more than a century would see this country utter deprived of the mainspring of its mercantile greatness.

"Manufactories without their motive power—Iron furnaces blown out—railway trains brought to a stand still, steamers replaced by sailing ships—our streets left to the gloom of oil lamps, and our fire-grates empty—such would be the dismal prospect of a near approaching time, could we give credit to such an inference!

The following table shows the coal production of Great Britain:

	TONS.				TONS.
1854..	64,661,401,	of which	were	exported.....	4,309,255
1855..	64,453,050,	"	"	"	4,976,902
1856..	66,645,450,	"	"	"	5,879,779
1857..	65,304,707,	"	"	"	6,737,748
1858..	65,008,649,	"	"	"	6,529,483
1859..	71,975,756,	"	"	"	7,081,949
1860..	83,208,581,	"	"	"	7,412,575
1861..	85,635,214,	"	"	"	7,221,718
1862..	83,638,138,	"	"	"	7,694,558
1863..	88,292,215,	"	"	"	7,529,341
1864..	92,787,873,	"	"	"	8,063,846
1865..	98,150,587,	"	"	"	9,170,477
1869..	125,000,000.				

In France it has been observed that the production of coal has similarly been doubled after every period of twelve to fourteen years, thus:

YEAR.	TONS.
1789	250,000
1815	950,000
1830	1,8 0,000
1843	3,700,000
1857	7,900,000
1862	10,000,000

These alarming results have caused recent and special surveys to be made throughout Great Britain, to ascertain the amount of coal, including veins of twelve inches thickness, which a conviction of the scarcity of coals already compels mining both in Britain and on the continent. And although the amount in store is said to be 80,000,000,000 tons, it is not probable that one-half of it will ever be exhumed; so that with the increased exhaustion of British colleries, soon reaching 200,000,000 tons annually, 250 years will be near the limit of total exhaustion!

The total amount of coal in the United States and Territories, if exhumed and placed in mass at the surface, would be equal to 2,000

cubic miles. Now, one cubic mile contains 7,000,000,000 tons, and our present supply is 14,000,000,000 tons. Our yearly consumption of coal is nearly 20,000,000 tons, whence it is readily seen that the American coals will serve, at the present rates, 700,000 years—a conclusion quite satisfactory to our young and ambitious countrymen!

And as we complain of the temporary advantages of foreign labor and capital in the marketing of the products of Coal and Iron within our borders, we may safely anticipate the time when this country will furnish fuel to Europe to propel her ships and factories, and to light her hearth and forge-fires,—another satisfactory conclusion!!

The question naturally arises, what quality gives to Coal its value eminent over all other natural products of this class?

We reply, that coal contains the greatest store or amount of heat in the smallest space, and yields it in the largest quantities, at the least cost, and besides is most universally distributed through all countries. It is, in short, the cheapest source of that wonderful power, STEAM, which is the basis of the world's progress; and upon this, more than any other quality, rests its present estimation among civilized nations. But its great range of heat is another important fact in this connection. It spans nearly the whole catalogue of Minerals, of which the earth's crust is composed. It will smelt, refine or volatilize all metallic ores, and has a residue left that will not be economized until we have gone farther into the realms of Discovery and Use.

Like the steam, into which form it compels water, its range is illimitable. We stand only upon the boundary of this Enchanted Land, and are voluble in our vain-glorious boasting that we of the nineteenth century are so soon to arrive at the climax of invention and enjoy the ripest fruits. But not so: We have used yet only the boyhood strength of steam.

We get an occasional hint as to its real power, when we find the far-separated fragments of boilers burst by superheated steam—having a power one hundred fold greater than our present uses require.

But let us inquire more closely. By the combustion of dry wood we obtain

Heat (Fahr.)	2,867°
Turf will yield (Fahr.)	2,782°
Bituminous coal, "	4,052°
Anthracite " "	4,170°
Coke, "	4,352°

The melting point of iron, the most useful of the metals, is 3,479° (Fahr.), far beyond the heat power of wood, and within the range of

Coal, giving the latter dominion over Iron, in all its ores and forms, with a surplus power of nearly 1,000°.

Had the heat power of coal been limited 1,000° lower, or the melting point of iron established 1,000° higher than it is, the entire Human Race would have been savages or barbarians until this day—shut out, too, from all improvement, as far as we now can see. To obtain a closer idea of the heat power resident in coal, let a person consider—as he puts three tons of it away in a cellar—that it contains a power greater than he can exert by working ten hours per day during a life of three score and ten years!

Rising with the power thus conferred upon Man, by his discovery of these relations and uses, we find in Great Britain, on sea and land, 100,000 steam engines, whose aggregate power is equal to the muscular force of 12,000,000 of human beings, working ten hours per day!

Now, making an estimate for the whole number of steam engines in constant operation, in all countries, on ship and shore, in factories and on railways, we shall find that their combined power is equal to the aggregate muscular power of 500,000,000 of men! The day is not far distant when Coal shall thus furnish force or power adapted to every conceivable need, and equal to the united energies of the entire human race!!

Familiar with it for years, we cannot yet properly estimate or realize this power.

Setting one thousand millions of human beings free from the burdens for ages of consuming, wearying toil—is not this liberty to the captive upon the grandest scale ever witnessed or conceived? Do not the oppressed, indeed, go free?

With this all potent force, to dig and fashion, spin and weave, build our houses, and cultivate our farms—toiling and watching day and night as a faithful servant, with a thousand eyes and hands, what shall be our Country's progress during the next two centuries?

We have said that we are living early in the morning of the day of progress, whose avant couriers are Coal, Steam and Iron. Let us consider.

The first locomotive or "mechanical traveler," as it was named by its inventor, William Brunton, in 1823, moved on a tramway at the rate of two and one-half miles per hour, with a load of thirty tons. In 1838, Robert Stevenson's engine "Rocket," ran at an average of fifteen miles per hour.

Recently, engines have been made to travel seventy-five miles per hour. One engine, weighing fifteen and three-quarter tons in Pennsylvania, hauled 16,298 tons (a train of 158 cars of coal, 2,020 feet long) eighty-four miles in eight hours.

But we are using now only 100 to 120 pounds of steam per square inch of cylinder, or piston-head. When we have constructed steel boilers of one-half to five-eighths thickness and raised steam to 500

pounds and 700 pounds per square inch, with cylinder and enginery in proportion, it is hard indeed to say what may not be done.

We cannot better conclude this portion of our subject than to introduce the appropriate remarks of Francis Jeffrey.

"The steam engine has become a thing stupendous alike for its force and its flexibility, for the prodigious power which it can exert and the ease, precision and ductility with which it can be varied, distributed and applied. The trunk of an elephant that can pick up a pin or rend an oak is as nothing to it. It can engrave a seal and crush masses of obdurate metal before it; draw out, without breaking, a thread as fine as gossamer; and lift up ships of war like a bubble in the air. In can embroider muslin and forge anchors; cut steel into ribbands and impel loaded vessels against the fury of the waves and winds.

"It is our improved steam engine that has fought all the recent battles of Europe, and exalted and sustained, through the late tremendous contest, the political greatness of our land. It is the same power which enables us to pay our national debt and to maintain the arduous struggle in which we are still engaged with the skill and capital of countries less oppressed with taxation."

But these are poor and comparatively narrow views of its importance.

It has increased indefinitely the mass of human comforts and enjoyments, and rendered cheap and accessible, all over the world, the materials of wealth and prosperity. It has armed the feeble hand of man, in short, with a power to which no limit can be assigned; completed the dominion of Mind over the most refractory qualities of Matter, and laid a sure foundation for all those future miracles of mechanical power which are to aid and reward the labors of after generations.

In the use and economy of our coals for iron making, it is a fact that the faults most complained of are not in our coals, but in ourselves. We do not eat bread made of straw, chaff, and bran, but rather, we thresh and winnow, and grind until we have superfine flour. We have learned to do this uncomplainingly, knowing the inevitable accompaniments of the raw material; and in like manner when we inspect, select, and improve, by the cheapest and simplest methods, our American coals will everywhere be found to answer every possible demand in the manufacture of Iron.

Nothing is more common in the West than the unqualified abuse heaped upon our Western coals. And I claim it a special honor to fight as a volunteer on every occasion of this kind, and vindicate the character of King Coal in the Mississippi Valley.

Our repugnance to sulphur is unavoidable, for our memories respecting this element are often unpleasant, and our anticipations still more so; and when used either in the stove or furnace the result is not only unpleasant, but ruinous.

But no coals exist without sulphur except charcoal. It is also an inevitable accompaniment, but disposed and distributed in such a manner, and so readily volatile and easily removed, that it becomes a left hand compliment to any person, finding fault with our coals, in this regard at the present time.

The heat either of the steam or hot blast will soon be introduced into the smelting furnace, and dispel from coal every vestige of sulphur.

We said in the preceding lecture that the entire area of Missouri, with a trifling reserve, was occupied either with the Coal measures, or devoted to dikes and placers of useful minerals. In many instances, south of the Missouri river, both these values occupy the same district.

The coals of Middle and Southern Missouri, were formerly more extensive and continuous than now appear. The upheaval which gave us the Ozark range and its numerous spurs and anticlinals—dividing, breaking, and filling the whole area with mineral veins and masses,—disturbed and probably carried away a considerable portion of the coal deposits, involving at the same time large masses in the pocket-form, as we now find them. Another portion yet remains, bearing marks of the former disturbance by its upturned and distorted strata, affording in many counties of Southwestern Missouri, enough for all needs, accessible by merely drifting, instead of the more expensive methods of shafting. As the result of those fierce physical movements, a much larger amount of coal than we could suppose, has been thus shut up in pockets, some of them having a depth of 50, and even 75 feet, and several hundred feet in extent. Also among the breaks of Eastern Missouri the same phenomena occur. They constitute a peculiar feature of the Coal system of Missouri. Several of them are now worked on the line of the Pacific Railroad; others have been found on the line of the South Pacific, and one is known to exist farther south, towards the Ozark range. It is probable that many more will be found in Southwest Missouri, containining each, at least, 1,000,000 bushels of coal. Within a few years coal has been found along the entire course of the Osage river, and most of its tributaries. Four different veins appear to be well defined —having a thickness of 2, 4, 5, and in many reported instances of 6 and 7 feet thickness. Explorations, systematic and thorough, will develop a still greater amount in many parts of the State, and we shall see that in Missouri as well as Pennsylvania, we have both ores and coals associated.

We have already referred to the middle portion of North Missouri as being the central axis of a very extensive series of coal deposits, and estimated the Chariton coal as extending 80 miles in width by 160 miles in length.

Allowing only one workable vein, this area gives 18,682,938,000

tons, supposing the stratum now being worked to maintain four feet thickness, to say nothing of the three smaller veins overlying it.

Valued at half a dollar per ton, the amount is nearly $10,000,000,000—one of the smaller items in the inventory of the mineral wealth of the State of Missouri. Mined and transported by railway at the rate of 1,000 tons per day, it will serve for a period of 2,770 years.

Unite the coals of North Missouri with the ores of the southern half of the State; connect them by railroads; bridge the Missouri with iron spans, so firmly that the northern half will never again think of secession. A mutual prosperity will thence arise to bind and unite stronger even than Iron bands!

We may safely assume that the earth will continue to be and appear in its present condition for and during a period of years long enough to use the supply of coals—notwithstanding modern prophecies and visions; because these "black diamonds" can not and will not be wasted.

Every ton of these coals is for man's use. They were laid down in the waste places of the earth long ago, in the middle ages of geologic history, and were slowly accumulated through processes that cleaned the earth of its poisonous carbon—storing it safely in permanent form, as we now behold it in every coal vein of the earth's crust. The tiny plant, whose transformation has become coal, is microscopic, and the forces or agencies employed were silent and obedient to the plan, whose unity was preserved through centuries, and whose results concentrate only in man—a work that was prophetic of us millions of years before the human race appeared upon the face of the earth!

It is estimated that the amount of heat contained in coal is the precise amount derived from the sun during the successive summers of its surface existence, and that by combustion we restore exactly this amount, to be used again in the world's vast laboratory. Truly, there is nothing lost! not an atom of matter, nor a pulsation of force. The hairs of our heads are numbered, and who can say there is no record of our thoughts and deeds?

New uses of coal are constantly being developed, so that, familiar as we are with it, it is still the greatest wonder in our midst.

We shall notice only two of these, as our limits and your patience are already trespassed.

"The once useless and fetid products of the distillation of coal have been made to yield sweet scents and savors. From its naptha are obtained the paraffine oil, and the beautiful translucent solid paraffine, which in brilliancy and beauty exceeds wax itself, and from its aniline are obtained a galaxy of colors, among which we need only mention mauve and magenta."

Can we say that in the nineteenth century, the gayest and richest colors that clothe and adorn the beauty of our land—richer than Tyrian purple or Damascene gold—colors that flash and dazzle in every assembly of fashion, were once the veritable rainbow colors of the

sun, as it shone millions of years ago upon the tropic and microscopic vegetation which has been transformed into strata of bituminous coal? Surely the day of miracles is not past, but remains forever with us!

The second of the new uses referred to is to the combustion of coal oils for the generation of steam, thus avoiding the tonnage and transportation of coal.

It is estimated that crude oil may be used both for locomotives and steamships, as well as for domestic purposes, in countries where coal does not exist—saving nine-tenths of the costs of carriage.

It appears improbable, however, that either the oil extracts of coal, or any other form of hydro-carbon, will supplant the use of coals. The most we can expect from the combustion of oils, is to supply the heat of flame, which comes from the volatile portion of coal, the stronger heat being in the fixed carbon, which is obtained in the coke or fixed-carbon portion of coal, and is the result of the second burning or oxidising of coal—having already a red or white heat.

The flame, which is all that the oils can supply, we judge to be quite limited in its amount of heat, and insufficient for the rapid generation of steam and the maintaining of a high degree of pressure, and therefore incompetent for heavy service. We must largely use our coals in their present form, improving them by inspection, and by process of cleansing, coking, etc., etc.

Successful experiments have recently been made in Missouri to use the better class of bituminous slates and shales in making steam, by means of a grate adapted to the peculiar nature of slates.

With the simple apparatus used, 40 gallons of water at the ordinary temperature, was raised to 212° in 15 minutes.

The large amount and general distribution of rich bituminous shales and slates, in districts where the true coals do not abound, indicates another supply of fuel hitherto ignored, but economical only in regions where coal does not exist under workable conditions.

Great improvements are also being made in the manner of using coals, with reference to complete combustion, insisting upon the entire consumption of all smoke and gases by such modifications of the fire-box or grate, that the atmosphere shall be supplied in precisely such proportions as the constitution of coal demands.

These improvements have been carried so far that one ton of coal, which formerly would serve a train for 25 miles, can now be made to haul the same train 50 miles.

It is true that much depends upon the quality of coals of respective localities. Thus we find that from a certain mine that 1 lb. of coal will evaporate 7 to 7½ lbs. of water, while another lb. of coal will evaporate only 6 to 6½ lbs. of water.

Experiments with coal and wood, comparatively, as fuel, whether for steam or domestic use, show a great economy in the use of coal

over wood at ordinary prices. It is estimated that one ton of coal is equal to 2½ cords of average or mixed wood, or two cords of best wood, a result, as will be readily seen, of the superior heat power contained in coal.

On locomotives the advantages of coal over wood has been variously estimated. The ratio of 26 to 17, established by the Illinois Central railroad, exhibits, doubtless, the average superiority.

Having already referred to the more striking features of the mineral wealth of Missouri, we will now consider the extent of recent discoveries. The astonishment, natural to every person after beholding the three mountains of iron in Iron county, already noticed, leads him to suppose that we may not again expect a similar display. But we find, upon search, that these gigantic masses are not a hundredth part of the accessible iron ores, of the same quality and similarly disposed, in twenty-five or thirty counties of Southern Missouri.

In February, 1869, the first ore bank was purchased, near Cuba, Crawford county. The partial development of this ore led to the discovery of other iron deposits in the vicinity. There are now known to be ten workable beds of red oxide, blue specular and hermatite varieties, within a radius of three miles from Iron Center (a station on the South Pacific railway).

A shaft forty feet deep was made in this iron bank, passing twenty-five feet through red oxide and specular ore—the last fifteen feet being massive, and requiring the force of powder in quarrying the ore.

At Cuba, four hundred tons iron ore are ready for shipment. Twenty tons are raised daily—one hundred tons could be as readily raised.

At St. James, iron has been worked successfully forty years, in charcoal furnaces. The supply of coal is unlimited.

In the vicinity of Rolla, large iron masses and dykes have been discovered. Transfers of iron lands are constantly being made at high prices, indicating that the ore is sufficiently magnetic to draw the iron masters of Ohio and Pennsylvania, and even of England and Germany, to more inviting fields than their own.

Twelve distinct banks have been discovered and reported in the Saline Valley, St. Genevieve county, and four in Perry county.

Two new banks are reported in Iron county, and several in places remote at present from any railroad.

Two new banks have recently been purchased on the extension of the Iron Mountain railroad. In all these instances the ores are massive, both specular and hematite.

On both sides of the St. Francis river, for a considerable distance, are found extensive districts of excellent hematite iron. Fourteen localities have been noted, each sufficiently furnished with ore to maintain furnaces for an indefinite time. A railroad is under construction, I am informed, from this region to Cape Girardeau, in order

to carry this ore to the Mississippi river, and return coal to the iron region.

The timber in the vicinity is equal to any demand that may be made for charcoal, which is known as the best fuel for working iron. It is most probable that a large proportion of the vast forests of Southern Missouri will be used for smelting and refining iron and other metallic ores.

The amount of charcoal which can be used in connection with the ores of iron and other metals, from forests in proximity to vast deposits of ore, and accessible both by river and rail, may be safely estimated at 182,000,000,000,000 bushels, allowing 300 cords of wood per acre, and 100 bushels charcoal to a cord of wood, on an area of 10,000 square miles.

Dykes or deposits of the same class of iron are found in proximity to both the Gasconade and the Osage rivers, and in some instances coal and iron are intimately associated. Perhaps 100 miles on the former stream and 150 upon the latter could be classed as productive iron districts. The same is true of the Meramec and other large streams.

Nor is it merely good fortune, that the railroads pass through rich iron districts. Construct railroads in any direction, and each one will have exhaustless iron within reach.

A thorough survey of the State would give us a system of these wonderful veins or courses of metallic ores, and lead to the discovery of a much larger amount than we have now ascertained.

A careful study of the distribution of minerals in all parts of the globe shows that order reigns everywhere. Minerals are surrounded with rock formations which are constant associates, and upon this order, science is founded. Those who have learned this alphabet of nature are quick to reach the most profitable conclusions.

It will be seen that the lines of anticlinas are marked and distinguished by a more uniform supply of ores. The reduction of iron from its ores and the various refining processes in its manufacture will oblige us to use our coals to an extent now scarcely apprehended and in this manner the vast forests of Missouri will disappear. Dr. Smith, already referred to, says:

"The total production of the Durham and Northumberland field, which, in 1854, was 15,420,615 tons, is for the year 1864 no less than 23,284,367 tons. This enormous increase is in great part due to the rapid development of the Cleveland iron district, in North Yorkshire. The iron furnaces in the three districts fed with the coal from this field were, in 1854, as many as 58; in 1865 they were augmented to 105 actually in blast; and large quantities of Durham coke are now conveyed to the western coast for the smelting of the hematite ores. The total quantity of coal thus consumed is probably much more than doubled in one decemium."

The smelting of iron ores in the furnaces consists simply in driving away the more volatile portions of the mixed ore, or in melting the iron out of the grasp of the more infusible parts. It is often found nearly pure; but it seems to be a law in the grand economy of nature that, to keep and preserve the metals from oxidation or rust, they must be united with such other materials that the resulting compound or ore will have little or no affinity with oxygen.

By this means the ores of all metals are carefully guarded from destruction through the long ages that must intervene before man shall require them for their varied uses.

The most common forms of iron are the Hematite and Specular ores. The former is named from its red appearance; the latter from its crystalline structure. These occur principally in our mountain ranges, or districts which have been subject to volcanic agency.

We have also nodular ore, and band ore, the sulphurets, and carbonates, besides the *fossil* ore, as it is termed in Pennsylvania, being composed of small ferruginous shells, which lived in the water of an ancient era in such vast myriads as to form strata of iron-shell-rock many hundred feet in thickness.

Is it not marvellous, at least, that these tiny creatures should have been furnished with iron, instead of lime, for their masks or shells, so that it has become a special contributor to human progress a million of years since he ceased to exist!

"Practically speaking, absolutely pure iron has no commercial existence. But, on the other hand, extraordinarily small traces of foreign elements exert a very marked influence on the metal, and it is precisely these small, and, in many cases, unnoticed differences of composition that render so many points in the chemistry and practical working of iron obscure and difficult to be understood.

When it is considered that the investigation of such problems calls for researches involving the utmost refinements of analytical chemistry, it is not remarkable that contradictory statements and opinions still abound on many points of the chemistry of iron-making."

It is proper, at this point, to notice the extent and quality of other ores which are being discovered and marketed.

Zinc ores are particularly abundant. From one locality, five miles from the Iron Mountain Railroad, is derived all the zinc ore used at the Carondelet Zinc Works. In Southeast Missouri it coexists with lead, and both follow a general direction northwest to southeast, from the Virginia mines to Mine-la-Motte, a distance of seventy-five miles.

Copper has been worked from the green and purple oxides, found on Current River, tributary to White River, in Shannon county. In 1856 several hundred tons were sent to Baltimore, from which copper was extracted.

Baryta, or heavy spar, which abounds in many counties, has an increasing demand.

From Cadet Station, Iron Mountain Railroad, in three years, 60,000,000 pounds have been shipped. It is worth nine dollars per ton, and is largely used for white paint, and for many purposes hitherto served by ivory. It is also largely used to imitate white lead, or sugar and flour, and the temptations in this direction are stronger than human nature can bear. But such transactions are first-class forgeries, deserving both fines and imprisonment.

Since three years, great excitement has arisen from reported discoveries of tin in the region of Mine la Motte, and other localities. Large areas of tin lands were bought and sold, and numerous assays were made, assuring a per cent. of tin far greater than the yield of the Cornwall or Sumatra ores.

The English ores of tin, or "tin stone," are valuable, which hold one and a half or one and a quarter per cent. of metal, and are sought after in deep mines which extend 2,000 or 3,000 feet below the surface.

The Missouri "tin-stone" is said to afford from two to four per cent. pure tin, and the rock formation or lode holding it is said to be twenty to thirty feet in thickness, extending several miles. In one instance a dyke of "tin-stone" was found to extend through Reeves' Mountain, from base to summit, nearly 1,000 feet above the bed of St. Francis river. The ores of tin are as easily reduced as lead, but the price of tin is far greater.

Why are not these ores worked? is a question often asked. If they are so rich in tin, we have most certainly a monopoly of this article in Missouri. The whole truth is shrouded in mists, but the following letter from General Sherman, while "non-committal" in some respects, is, to my view, encouraging:

HEADQUARTERS ARMIES OF THE UNITED STATES,
WASHINGTON, D. C., Jan. 27, 1870.

J. P. MURPHY, ESQ., *Jefferson City:*

DEAR SIR: Yours of January 22d is received. I did visit the Tin mines near the Iron Mountain, and did have some assays made, both in St. Louis and in London.

These assays convinced me that the mineral was not rich enough to work, with the present cost of labor, etc.

This is as much as I am willing to say.

Yours truly,

[Copy.] W. T. SHERMAN,
General.

Eight miles southwest of Fredericktown, in Madison county, where one of the tin mines of Missouri are located, $82,000 have been already expended for machinery, buildings, fixtures, lands, etc., etc. Tin smelting will doubtless soon be commenced, and the Tin

lands be placed upon their real merits, and be judged by their profits. It is quite certain, too, that deep mining will be as profitable in Missouri as elsewhere—whether it be for Tin, or Zinc, or Lead, or Iron.

Quite as important are the recent discoveries of gray and red Granite, under such conditions that extensive quarries can be opened, and Granite blocks of dimension size sent to any part of the country, or to the city of St. Louis. But, no! this stone is "rejected by the builders." We must send to Scotland for Granite base-blocks or pillars, paying one thousand instead of one hundred dollars for an inferior quality.

Seven miles from Farmington is a large quarry of Carnation Granite, of beautiful tint, and in extent, unlimited. It is capable of the finest polish, and will prove a most valuable acquisition to the city of St. Louis—in whose reconstruction, all are glad to see beautiful building stone used, instead of dismal, cheerless brick. The front pillars of a New York jobbing house, from the Scotch quarries, cost $20,000, and single shafts for cemetery use, from the same source, usually cost $1,100. With the new process of quarrying, this rock can be cut or split in any required form. These Granites, gray, red, and carnation, deserve the immediate attention of architects and capitalists.

By the discovery of placers or dykes of metallic ores, a great value is immediately conferred upon lands.

Professor Shepard mentions an instance. A few hundred acres in Ohio—not worth one dollar per acre—by the discovery of band ore, was sold for $30,000, and is now estimated at $250,000. At another place a man asked $300 for a small tract of Iron land; but the Iron-workers preferred to pay 10c per ton royalty for the ore. The amount thus paid in a few years was $4,000. In Missouri tracts of land that were unsaleable at one shilling per acre—the purchaser having sympathy as the *bitten* party—cannot now be had for $250 per acre. Sales are often made of lands that have risen from $1,000 to $40,000.

In childhood we have seen light follow shadow across the meadow, or harvest-field; and it is not less delightful now to see lands, long burdened by unworthiness, set free, and made not only respectable, but aristocratic. But we forbear. In the midst of such riches, hidden, but not unsearchable, a man feels like a beggar-boy in the Bank of England, with only a six pence in his pocket.

But if *we* cannot enjoy we can, at least, be grateful for the limitless supply vouchsafed to coming generations, and with security interpret the vast supplies of Coal and Iron as mute prophecies not only of the permanence of the present order of things, but also of the unexampled prosperity of our country.

There is Iron enough in the State of Missouri to build railroads, ten miles apart, all over the Earth—cobweb the air with telegraph lines—span every river with Iron bridges, and supply ordnance and iron-clads for all nations during the next thousand years!

It is not proposed to take this contract just now; but simply to compete with other iron marts of our country, and manage to furnish a reasonable share of the present demand.

We may next consider the value conferred upon Iron by skill and industry. A locomotive which weighs fifteen tons of Iron is worth $20,000. The value of the amount of Iron ore required in its construction is, perhaps, $100! A pound of Iron will make 200 to 300 main springs, small size, and 80 to 100 per pound large size.

From 200 to 400 hair springs, of smallest size, can be made from one pennyweight of Steel, which will also make 80 large size hair springs. A pound of Iron or Steel, Troy weight, will furnish, therefore, from 48,000 to 96,000 hair springs. The price of these articles varies from $1.00 to $3.00 per gross; very fine hair springs cost $10.00 each. The price of main springs is, average, $18.00 per gross.

A fine laminated steel gun-barrel—its raw material costing twenty-five cents—is worth $30 to $50.

In regard to the new uses and application of Iron, let us notice the statement of one of the pioneers of railroads in the West, Mr. A. T. Hall, of the Chicago, Burlington and Quincy Railroad, "that there is more room for progress in the perfection of railways henceforth, than the entire improvements made during twenty years!" Chief among these is the use of Steel rails, requiring for their production additional skill and capital.

We may notice, next in order, the condition of Iron manufacture in our own country, as compared with the Iron Manufactures of England.

The production of pig-iron in England and United States, from 1854 to 1862, was:

	ENGLAND.	UNITED STATES.
1854	3,069,838 tons	716,647 tons.
1855	3,218,154 tons	754,178 tons.
1856	3,585,387 tons	874,428 tons.
1857	3,659,447 tons	798,157 tons.
1858	3,456,064 tons	705,004 tons.
1859	3,712,904 tons	840,428 tons.
1860	3,826,752 tons	913,774 tons.
1861	3,712,390 tons	731,564 tons.
1862	3,943,469 tons	787,662 tons.

The amount for 1869 was, for England 4,900,000 tons pig Iron!

The increased demand for Pig Iron in the United States is not far from 200,000 tons per annum, while our increased production will average only 60,000 tons per annum. A deficiency of 100,000 to 140,000 tons yearly is therefore supplied from foreign Iron markets.

"In France, the annual product of Pig Iron was, in 1866,

1,253,100 tons, and 1867, 1,142,800 tons, showing a decline of 110,300 tons.

"In Austria, the official returns of the Iron trade show a diminution of forty-two per cent. in 1866, as compared with 1860, and of sixty per cent. as compared with 1862."

The Iron production of the world for 1856, as stated by Mr. Hewitt, was as follows:

COUNTRIES.	Pig Iron—Tons.	Wro't Iron—Tons.
England	4,530,051	3,500,000
France	1,200,320	844,734
Belgium	500,000	400,000
Prussia	800,000	400,000
Austria	312,000	200,000
Sweden	226,676	148,292
Russia	408,000	350,000
Spain	75,000	50,000
Italy	30,000	20,000
Switzerland	15,000	10,000
Zollverein	250,000	200,000
United States	1,175,900	882,000
Total	9,522,047	7,205,026

Including all classes of imported Iron. We give the following for the United States:

	1868.	1869.
Iron, pig and puddled	83,564	132,491
Iron, bar, angle, bolt and rod	38,000	51,738
Iron, railroad of all sorts	255,462	294,369
Iron castings	1,213	1,677
Iron hoops, sheets, and boiler plates	15,999	31,292
Iron, wrought, of all sorts	4,020	7,364
Total	399,458	518,930
Steel, unwrought	14,847	15,612

As we look at these statistics of foreign importation of Iron, we are inclined to question the intruder, and enforce the provisions of the Monroe doctrine, which are neither latent nor dormant, among our citizens!

We are debtors now to Europe in a sum exceeding $1,000,000,000, chiefly for Railroad Iron. It is not a National debt, strictly considered, but our railroads are bound for its payment. Foreign Capital thus dictates their management, and tells us both when we can ride and what we must pay per mile. It is not at all consoling to understand that cheap capital and labor enable English Iron Masters to

impose this burden upon us, especially when we consider that our own ores produce Iron of far better quality, in the very districts traversed by English rails.

To-day, English Railroad Iron costs $35 per ton in gold; the freight to New Orleans, $5 per ton; duty, per ton, $15.68; add 20 per cent. premium for gold, and we have the cost of a ton of railroad iron in currency, $66.12. The cost of American Iron is about $85.00 per ton.

But why should this difference exist—a difference of nearly $20 per ton, cheaper, in favor of English Iron?

We will answer, briefly:

The price or worth of money—three per cent. in Britain, and ten per cent. in the United States—makes our Iron cost $5 more per ton than English Iron.

The capital of British Iron masters, accumulated through a hundred years of mining industry, enables them to lend money, in the form of Iron, at a small rate, and on long time.

We, from our recent beginnings, especially in the West, cannot offer such terms; and when we would grant time to consumers, or customers, the Englishman outbids us by his trump card of *eternity!* In other words, he says, "Pay the interest, merely; the Iron being used simply to create a permanent indebtedness!"

But the especial cause of cheap English Iron, is the cheap or low-priced labor of English operatives; and in this regard we have no desire to compete. We could not if we would. The condition of our country is such that both common and skilled labor will command wages sufficient to give every laborer an independent home—and this, fellow citizens, is truly an American Institution!

We present a table showing wages paid to workers in Iron in England and Germany:

Wages paid in South Staffordshire, England, in 1866.

	PER DAY.					
Common laborers	2*s.*	6*d.*	to	3*s.*	0*d.*
Puddlers	7	6	to	7	10
Puddlers' helpers	2	6	to	2	11
Puddle rollers	9	0		—	
Heaters	7	0		—	
Heater helpers	3	6		—	
Finishing rollers	11	0		—	
Shinglers	9	0	to	15	0
Machinists	3	0	to	16	0
Blacksmiths	4	0	to	5	0
Masons	7	6	to	8	6

The average price of skilled and unskilled labor at the iron works in England does not exceed 4*s* a day.

At the coal and iron works of Creed & Williams, in Belgium, the wages paid in 1866 were as follows:

	PER DAY.
Common laborers	1*s.* 2*d.* to 3*s.* 6*d.*
Loaders of coal	2 6 to 2 11
Wood-cutters	2 6 to 2 11
Wood or tree-setters	3 1 to 5 0
Miners	2 11 to 4 5
Exceptional men	5 0 to 6 0
At the Blast Furnaces.	
Fillers	1 1 to 2 1
Box Fillers	1 4 to 1 8
Common laborers	1 5 to 1 8
Furnace-keepers	2 1 to 2 11
In the Rolling-Mill.	
Puddlers	4 2 to 5 6
Helpers	2 3 to 3 1
Rollers	4 2 to 5 10
Helpers	3 4 to 4 5
Shearers	1 10 to 2 6
Common laborers	1 5 to 2 1

In all other European countries wages are lower than in England. That is, 62½ cents day wages is paid common laborers; while the daily wages paid here will average $2 00!

As a consequence of low wages, and the tyranny of masters, we are obliged to infer the pauperism and crime and misery of hundreds of thousands who are too weak to resist, and too poor to come to a land where labor finds reward.

Reliable statistics show us that, in 1868, 500 families died of starvation in England. We can strive against such odds only in one way. But we have no disposition to appear in the arena where pitiless poverty and death, grim and gaunt from starvation, shall also have free course. We will fence out such unsightly apparitions and protect our manufactures, in order that we may honorably sustain our industry and give to every laborer such wages as may enable him to be a freeman.

The future demand for iron may be anticipated from the progress of railroad building since 1827 to 1870:

Table showing the Annual Progress of Railroads Constructed in the United States since 1827.

YEAR.	MILES.
1828	3
1829	28
1830	41

1831	51
1832	131
1833	576
1834	762
1835	918
1836	1,102
1837	1,431
1838	1,843
1839	1,900
1840	2,197
1841	3,319
1842	3,877
1843	4,174
1844	4,311
1845	4,522
1846	4,870
1847	5,336
1848	5,682
1849	6,350
1850	7,475
1851	8,589
1852	11,027
1853	13,497
1854	15,672
1855	17,398
1856	19,250
1857	22,625
1858	25,090
1859	26,755
1860	28,771
1861	30,593
1862	31,769
1863	32,741
1864	33,860
1865	34,442
1866	35,351
1867	36,896
1868	38,822
1869	42,272
1870	48,860

There was an increase in 1869 of 6,000 miles, of which the total cost per mile is $45,000; and the aggregate cost is $2,198,700,000.

$298,000,000 were spent in 1869 in extending railroads. 13,446 miles are now projected and in process of building.

There were completed, in 1869:

In the North Interior States.....3,976 miles of railway.
" Middle Eastern States.....1,026 " "
" Pacific States..... 922 " "
" South East and South West State.... 662 " "

4,000 miles of railway were built in the upper part of Mississippi Valley in 1869, and 2,000 miles more to make Eastern connections, while only 600 miles were constructed in all the rest of the country.

These statistics show the effect of the Union Pacific Railway in stimulating other corporations to make connection with it in order to secure a share of the carrying trade across the continent.

In all 5,000 miles extra of railroads have been added as the direct impetus of the first road to the Pacific, which a few years ago was regarded as impossible, and whose projectors were considered insane.

The concentration of railroads from the Southern States, with those of the Middle and Northern States of the Mississippi Valley, at some point probably in the Indian Territory, uniting in another grand trunk route across the continent, on or near the 35th parallel, is an event that every person anticipates. The Kansas Pacific Railway is rapidly approaching the mountains, pushed with an energy that will find its way through, and across to the ocean. Add to these statements and statistics the fact that railroad iron must be supplied anew, or re-rolled, every ten years, and we may comprehend to some extent the trade and manufacture of iron, which ought to be American.

The locomotives and cars of Europe, would reach from St. Petersburg to Paris, being nearly 1,000,000 in number. The total length of Railways is 70,718 miles. The locomotives number nearly 20,000, and their combined work is a transit of 60,000,000 miles per annum.

The amount of Iron used for rails, is 7,500,000 tons, and the annual consumption of Coal is 4,000,000 tons.

In the United States, the amount of Iron laid down on Railways, is nearly 4,000,000 tons, of which we may estimate at least 3,000,000 tons as foreign iron.

During the year past 65 new blasts furnaces have been erected in 15 States. Of this number 6 are in New York, 1 in New Jersey, 19 in Pennsylvania, 1 in Maryland, 4 in Virginia, 6 in Ohio, 5 in Indiana, 3 in Illinois, 5 in Michigan, 2 in Wisconsin, 6 in Missouri, 3 in Kentucky, 1 in Georgia, 2 in Alabama, and 1 in Tennessee. From the new and old, our productive power is now increased to 2,500,000 tons per annum. Fifty additional furnaces are being erected this year, and our product for 1870 will doubtless reach 2,225,000 tons or half the production of Great Britain.

The present market price for American Pig Iron ranges from $33 to $35 per ton, to $42 for best quality. The total cost of making Iron varies according to circumstances of ore, fuel skilled labor, and machinery which involves a large capital.

At Carondelet, the actual cost is as follows:

Fuel for ton of Iron		$12 00
" " " Ore		8 77
" " " Lime		35
Labor and incidentals		5 00
		$26 12
Add for Transportation	$2 00	
" " Commission	1 25	
" " Interest	50	3 75
Total cost		$29 87

In Indiana—Brazil.

Fuel	$ 8 40
Ore, I. M. 1⅝ tons	16 49
Lime	50
Labor, etc	5 00
	$30 39
Add marketing	3 75
	$34 14

In Pennsylvania, in 37 Furnaces in the Lehigh, Schuylkill and Susquehanna regions, the cost of making one ton of iron, was $29 63, average for the last six months of 1869.

In Ohio—Southern.

Ore, 1½ tons Missouri Ore	$15 00
Lime	1 50
Fuel	9 00
Labor	3 00
	$28 50

In the last two instances we do not know the cost of marketing.

We are therefore compelled to regard the statements of certain leading papers, that Iron is made at a cost of $22 per ton, as unreliable, no matter how these estimates are obtained; and the statement that in Tennessee, Iron has been made for $19 per ton, is wholly untrue, and could only have been made concerning those furnaces whose proprietors have been obliged, from heavy losses, to suspend operations.

The shipment of Iron ore from Lake Superior Iron Mines, in 1868, was as follows:

Jackson	Mines	131,708 tons.
Cleveland	"	102,213 "
Marquette	"	7,979 "

Lake Superior	"	105,745	"
New York	"	 45,665	"
Lake Angeline	"	 27,657	"
Edwards	"	 19,360	"
Iron Mountain	"	 3,836	"
Washington	"	 35,855	"
New England	"	 8,257	"
Champion	"	..... ,255	"
Barnum	"	 14,380	"

The shipment and distribution of these ores, however, over a distance of more than 1,000 miles, to meet, at a suitable place, the fuel for its reduction, must always prove a serious inconvenience and loss, as compared with the Missouri ores, with coal and other fuel near at hand, and adequate, both as to quality and quantity.

The yearly consumption of Coal in St. Louis is now 16,950,000 bushels, and the shipment of Iron ore by Railroad, from the various Iron districts, is nearly or quite 1,000 tons per day. Both these estimates will largely increase for the year 1870.

With facilities which Railways should be prompt to give for the speedy transportation of both Coal and Iron, and with the encouragement of these industries by the State, in every legitimate manner, and with the protection which justice demands, Missouri will become the first of the American States in the manufacture and commerce of Iron, and the consequent profits of Agriculture, and St. Louis, at no distant day, will be the largest Iron mart on the Continent.

APPENDIX TO MINES AND MINING.

DESCRIPTION

OF

SOUTHWESTERN MISSOURI

AND

SOUTHEASTERN KANSAS,

INCLUDING

Soils, Climate, Water, Drainage, Building Material, Fruits and other Products, Grasses and Grazing, Railroad Lands,

HINTS TO SETTLERS, &c., &c.

Having made several examinations of the southeasern counties of Kansas and the southwestern counties of Missouri within the last year, having in view the topography of the country as well as its mineral treasure, I propose to write out, for the benefit of those seeking homes and investments, such facts as came under my notice.

The country under consideration lies south of the Kansas Pacific Railway, and includes that portion of the State of Kansas lying east of a line drawn south from Junction City to the Indian Territory, with the counties of Jackson, Cass, Bates, Barton, Jasper, Newton, Lawrence, Dade, Cedar, Vernon, St. Clair, Henry, Johnson and Lafayette, in the State of Missouri, This survey also takes in the Cherokee Neutral Lands, the Osage Ceded Lands, and a portion of the Osage Lands proper. The district surveyed extends 175 miles north and south, by 250 miles east and west, and includes that portion of Kansas and Missouri towards which emigration is so rapidly tending.

This region is drained principally by the Osage, Neosho and Arkansas rivers, and their tributaries. The general direction of these streams will, therefore give the slope or inclination of land, which can

be specially determined for every section by reference to any good geographical map of the two States. The best map now extant is Keeler's—Colton's or Blanchard's, however, will answer most purposes.

The most common inquiries relate to the basis of the country itself. What are its foundations? or rather the rock formations underlying its surface?

It is an established principle that soils take their character from the subjacent rocks, and with this in mind, the traveler may learn much of the rocky structure of any region, by noticing carefully the loose earth or soil at the surface. The geological formation to which this portion of the country is referred, is called Carboniferous, in which are found the Coal measures. A large portion of Eastern Kansas is upper carboniferous—sometimes called Permian. This extends beyonds Fort Riley, near which the Cretaceous formation appears, and extends beyond Salina, where the tertiary series appears above it, and which extends beyond Phil. Sheridan and Fort Wallace, where the Cretaceous group again occurs, and extend to the foot hills of the Rocky Mountains. The succession of these formations is like the courses of shingles in a roof rising westward. The overlaps are irregular, but they do not dip, as has been often stated in public reports. As the kernel is of more importance than the husk, so it is of more consequence to describe the valuable materials which these rock formations contain.

The common building material is limestone, of which there are several varieties, viz: yellow, white and brown—besides a coarse massive limestone, suitable for heavy work, such as piers and abutments for bridges. The Railroad bridge at Kansas City affords an example of this class of stone. A much coarser variety is found in large quantities, disposed in regular ledges, along the Neosho and Verdigries rivers. Small patches of it are also seen in the "border tier" counties, where it appears like the loose or lost rocks of the drift formation, while in reality it is the last remnant of a series increasing in quantity westward.

The Fort Scott Marble is an interesting variety of limestone belonging to the coal measures. It forms a ledge or stratum from six inches to thirty inches in thickness. It is very compact and hard, and is often affected by fractures and cleavage lines. It can be quarried in masses and sawed into slabs for table tops and other cabinet uses. It is beautifully variegated with golden threads of every imaginable curve, which are the rims or edges of shells of various genera and species, inhabiting the waters, in ages past, of the great Carboniferous sea. Another class of building material, called magnesian limestone, or Junction City Marble, is quarried and shipped extensively from Junction City, Kansas—near Fort Riley. It is very extensive, being from four to seven feet thickness, and forming a cap-rock of many thousands of square miles of Middle and Eastern Kansas. It

not only quarries, but cuts easily, and is worked to any dimension required, by saws and planes. It is of light drab color and makes a beautiful front. The State Capitol, at Topeka, is built of it, and several new buildings and residences at Kansas City and Leavenworth are finished with this material. This limestone should not be confounded with the lower magnesian limestone so prevalent in the middle counties of Missouri—seen at various points on the Missouri river—the State Capitol being built of it: these belong to the lower Silurian division of rock, while the former are of the Upper Carboniferous or Permian series.

The sandstones are everywhere prevalent, but are abundant near the Missouri border. They alternate with limestone, in such a manner that the farmer may choose his material for house, barn, and fence. These sandstones are of various dimensions, and no part of the country is without them. It is worthy of notice, too, that both these classes of stone are near the surface, but not so near that they materially interfere with farming, nor so deep as to make extra cost in quarrying. The edges of these strata are seen in all directions, wherever ravines, or creeks, or ridges, or mounds mark the general surface. The rule pertaining to highlands or uplands is, that the cliff or edge separating them from the bottom lands is the outcrop of a persistent ledge, and on a strip not 60 feet wide, in nearly every township, are quarries that can never be exhausted, of the cheapest and best building material.

There is scarcely a section of land in this vast domain that is not supplied in this manner with one or both of the above described classes of stone.

The improvements already made are characteristic of the geology of the region. Stone fences, barns, houses, and walks are common, and this material will continue to be used. Those who are wise will discard brick, because stone is cheaper and far more valuable, while for beauty or effect, all will prefer stone.

The water supply of this country is closely associated with the system of rocks, and is a natural consequence of extensive rock formations lying near the surface.

Who does not see that strata of limestone, sandstone or slate riven by fractures and separated by layers, forming innumerable crevices, will give rise to myriads of springs of the purest water?

This feature is so extensive that it is safe to say that no portion of the United States is so well watered as Southeastern Kansas and Southwestern Missouri, excepting perhaps the Indian Territory.

It is also owing to this peculiar feature that the streams are for the most part clear as crystal; especially those flowing south and southeast, while those flowing into the Osage, passing through deep clay drift, though generally clear, are sometimes turbid.

Streams leading eastward are also slower, while the southern streams are rapid, showing that the general average of surface, in

lines drawn east and west, is nearly level, with a slight rise westward. The slope southward is far greater, and gives greater advantages for mills, factories, &c. The drainage system of this extensive region is so perfect that not an acre in a thousand is unfit for cultivation from excess of water. We did not see a swamp or marsh in our travels. Crossing the prairie in any direction, we find that the high grasses and reeds which generally indicate marshes, are nearly as firm as the uplands and ridges.

It is a wonderful system which thus provides for the drainage of every acre of land without loss! The solving of this problem indicates the highest wisdom. Our preachers may here find new views of the Divine Goodness quite as practical as those sublimer views which often beguile our moral teachers of so much valuable time. This problem has been perfectly solved for the portion of Kansas and Missouri under consideration. In performing this stupendous miracle there could be only one result, viz: a system of rolling prairies! But lest we should seem to give undue importance to so common a fact, we ask any observer to notice that every acre of land has its own angle inclination, giving in the aggregate millions of topographical lines, all diverse, and all so related as not in any way to hinder the escape of water falling in rains!

Coal is universally, but not evenly distributed throughout this area; but it should be remembered that most of this region comprises the upper coal measures, leaving the middle and lower yet to be explored by test wells and shafts. The surface coals, or those out-croping in ravines, and often on prairie slopes, are of excellent quality, varying in thickness from one to five feet. This class of coal has been extensively mined, and many points are already noted for their extensive coal trade, viz: Fort Scott, Burlingame, Emporia, Ottawa, Lawrence, Topeka, Pleasanton, Oswego, Osage Mission, Chetopa, Kansas City, Camden, Lexington, Centertown, Knob-Noster, &c., &c.

The most extensive deposits have been found on the Cherokee Neutral Lands; but recent discoveries assure us of abundant supplies, also, upon the Osage Lands.

These coals lie so near the surface as to admit of stripping. A majority of the farmers, by this means, have a coal patch or mine at home, from which their own wants are supplied. When the coal bed is scant, a journey of several miles is sometimes performed. And when stripping requires too much labor, the next farm or section may afford a better opening.

And these coals are excellent for all purposes—making iron either in furnaces or rolling mills—making steam, whether for factories, mills or locomotives—in gas works or for domestic use. They are singularly free from sulphur and burn with the clear white flame of Pittsburgh coals.

Their general distribution adds greatly to the value of the lands in this part of Kansas and Missouri, as all will appreciate.

A farm of 160 acres, underlaid with coal, is of more value than the same area with 80 acres of woodland. In the former case fuel is already prepared and stored for the wants of a hundred generations. In the latter, a few years would exhaust the supply.

This bituminous coal field, which is so ample in its extent, but generally affording only thin beds from ten to twenty-four inches, is occasionally enlarged, giving three feet or more in thickness; but these are merely local surprises. The fuel question—quite as important as food—is not and cannot at present be determined, but every year's search gives additional encouragement to settlers in proof that there shall be no lack of fuel for the thousands of people that will come hither as the years go on.

Unreliable reports are being circulated by persons who have selfish interests to promote—statements, for instance, that Kansas is underlaid with twenty-one veins of coal, from one to eight feet in thickness. The geological reports of Western States, which scarcely ever contain either correct or positive statements, declare that Kansas contains one-seventh of all the coal in the United States. Such persons should be arraigned and branded upon the forehead with the word "ignoramus," and if they are fraudulent as well as ignorant, justice should be more severe.

The simple facts are good enough, and the truth, either spoken or written, is the most beautiful of all languages. But if it should prove true that Kansas is not underlaid with veins of workable coal, yet we do know that the area of valuable coal upon and under the surface is constantly enlarging by the accidental discoveries of settlers, and by those who are making diligent search.

Farther west, in Middle Kansas, Texas and Nebraska, the Tertiary coals are found in abundance, and still further west, but lower in geological position, are found in inexhaustible beds, or strata of cretaceous coals of a quality equal to any service that may be required of bituminous coals.

We have already referred to the plentitude of coals, still further west, but we declare again upon the authority of a measuring rod, that the largest body of coal in the world lies between the Missouri river and the Rocky mountains. We know that it extends over 1,200 miles from the British possessions to Mexico, and that it out-crops along the entire line at the foot-hills of the eastern slope of the Rocky range. Its breadth we know to be, in some places, over 120 miles. It contains five workable veins, averaging over six feet in thickness. The distribution of these coals to all parts of the plains, and to those States and Territories where they are needed, will be a leading business of all railroads extending across the mountains. Within eighteen months, coal has been discovered near Ellsworth, on the Kansas Pacific Railroad. It is a spongy coal, but exists in great

abundance, in veins from two feet to three and a half feet thick. It has been referred to the Tertiary group of rocks. It will possibly supply 250 miles of railway. Since its development and use, wood fallen from $50 to $10 per cord.

Timber, as usual, accompanies all large streams in quantities sufficient for most purposes, fencing, barns, &c. Pine lumber is brought from Chicago or the railroad shipping points on the Mississippi River, and to some extent from Texas.

To those that have learned that prairie is more valuable than timber, there is no deficiency in this respect. The leading varieties are oak, poplar, hickory, black walnut, pecan, hackberry, &c. The quantity of timber, compared with prairie, decreases westward and increases towards the south until in some portions of the Indian Territory and Texas, the country is half covered with groves.

The soil of this district presents but few varieties. It is for the most part the rich, dark carbonaceous mould of the great prairie system of the West. It varies from one to seven feet in thickness and is underlaid by a stratum of hard clay, or "brick clay," when not underlaid with limestone, but so compact that cisterns may be dug or scooped in it, where there is no living water upon the highlands and divides. Occasionally, the soil is of a red ochreous color. Among sandstone ledges or base rock, there is sand and clay intermingled in the soil above. During the drift period large tracts were overlaid with thin gravel beds, derived from the vast conglomerate deposit lying far to the north and west, and these again were doubtless derived through the agency of glaciers from the Rocky Mountain range. But of whatever variety, it is equal to any crop service that may be required of it, upon terms which every good farmer knows. The practice of selecting bottom lands for farms and rejecting uplands, or reckoning them of little value, is erroneous. Within two years the uplands have been cultivated and have proved to be as productive as river bottoms.

The best selection for a farm, however, should include both upland and bottom land, and this can generally be secured, except on the high divides.

But the especial attraction of South-eastern Kansas are her unfailing fruits. It is a well known fact that in September, 1869, at the National Fair, held at Philadelphia, the highest prize—a gold medal—was awarded to Kansas for the best display of assorted fruits, as apples, pears, peaches, grapes, &c. But it should be remembered that in the year 1869, there was a general failure of fruits in the Western States. In Kansas and Missouri, fruits large and small, never fail; and with this assurance it will soon become the fruit-grower's paradise. The region between the Kansas Pacific Railroad, and the north line of the Indian Territory, 160 miles north and south, comprising South-eastern Kansas and Western Missouri, is all within the great

fruit bearing region of the United States. But it will be seen, at the same time, that the timber and broken regions of Illinois, Indiana and Missouri also extend across this line, and being for the most part inaccessible by railroads, we perceive that Kansas possesses decided advantages over those regions.

It needs no wisdom to forecast the immense fruit trade of Southern Kansas, whose beginnings have already surprised the whole country.

The temperature, salubrity and moisture of the atmosphere, in a word, the climate, might be easily inferred from the foregoing facts. Of the temperature, a good measure, in the winter, is the thickness of ice, which makes from four to ten inches. The fall of snow is light, and soon disappears. The air has that clearness which is noticeable upon the plains, and is a proof of its purity. Fresh meats exposed, will dry, but not decay.

Invalids from many States have sought their health here and found it. This mild, equable climate of the middle and lower temperate zones has alone attracted thousands of families from Northern Illinois, Wisconsin, Michigan and Minnesota, where only the most vigorous can hope to realize the limit of three score and ten years.

The precipitation of rain will average for each year 40 inches—a fact which ought to banish the fear of all who desire to dwell in this goodly land, but who dread the "drouth," or dry season. We will here state that with the year 1860, this entire region has had only two dry seasons. But this would hardly excite remark in older States like Ohio, where drouth is more severe. As a consequence, both of rich soils and mild skies, the grasses which grow luxuriantly during the summer, afford, in winter, plentiful food for flocks and herds. The entire region south of the Kansas Pacific Railroad is the herdman's country. That he shall become rich, is only a question of time. The prairie grasses, withered by frosts and dried in the "Indian summer," afford subsistence during all the winter months; it being necessary to provide for the occasional snows. Most farmers as well as herdsmen cut a few tons of hay. Little or no care, beyond watching, is bestowed upon herds, and therefore the cost is trifling. A faithful lad and his dog suffice for a drove of 500 head. Further south even these are not needed. The proprietor merely cuts or brands his mark upon each animal, of which public notice is made, and the purchaser may select his number, bearing that brand, from all herds, indiscriminately—the brand or sign being the sole and sufficient proof of his property.

This trade must assume immense proportions, increasing with the years, and receding towards the unoccupied lands. Large grazing farms, however, will take the place of ranges, herds and herdsmen, with far more benefit to all branches of industry. There are already enclosed and occupied, hundreds of grazing farms, comprising from one to five sections of land.

It has been often proved, and is now generally acknowledged that domestic cattle of improved breeds are far more profitable than Texas cattle, herds of which are for the most part, indiscriminate crowds of all sizes, ages and conditions, bought chiefly for their cheapness, on account of the hazard and hardship in transferring the drove from the plains of Texas, or the Indian Territory, to a shipping point.

The profits of raising cattle are greater than offered in any other branch of agriculture. The best drovers and herders say that the average outlay of $30 in the spring or summer, will secure $50 in sales in the fall or winter of the same year, and this may be relied on. From yearly comparisons made as to the actual costs of cattle in New York. Ohio and Illinois: Missouri and Kansas will exhibit the greater advantages, which this region must always possess.

We will not further attempt to describe the natural advantages of this country, nor note the excellent points of any particular section; but we positively declare that no man can suggest a substantial good which this country does not possess. For soil, climate, water, drainage, stone, timber, coal, grasses, grazing and general farming, these portions of Kansas and Missouri are unrivalled, and, we believe, unequalled. These items, the sure bases of wealth to all participants, have already attracted many thousands—how many, we will not attempt to state; but the census of 1870 will present amazing contrasts with the census of 1860. And still they come. Long trains of covered wagons are daily seen crossing the Missouri river, bearing south and west until they reach these coveted lands. "The whole country will soon be occupied," says the traveler, on meeting these wagon trains.

Lands are still cheap and abundant. Prices are suited to every one, whether he has means or not. Of the government, he can still get farms, by the pre-emption or homestead law. Railroad companies, having land grants, contract at low prices, on long time, at six per cent. interest, permitting the purchaser to use his money for improvements. Non-resident or unoccupied lands can also be had upon terms nearly as favorable as railroad lands. The price of lands will increase steadily until farms in Missouri, Illinois and Kansas shall have rates almost uniform. Sales of land in the two former States at fifty and seventy-five dollars per acre will not be rapid while the rich farming lands of Kansas, equally productive, can be had for one-tenth of those prices. These lands will advance until the universal standard is reached, viz: "The worth of an acre is three average crops." The high-priced lands are, of course, upon the lines of railroads, and if near stations, they can be purchased at ten to twenty dollars per acre, but upon wide areas and divides, far from roads, either in operation or prospective, the prices are much lower—from two to five dollars per acre.

A large portion of the eastern half of Kansas is held under acts, both of Congress and Legislature, relating to railroad grants. They

comprise the Indian reservation, such as the Delaware, Pottawattomie, Sac, Fox, Cherokee and Osage lands—in all nearly thirteen millions of acres.

In the Congressional and State grants, the alternate section has been open to settlements by homestead, exemption, or pre-emption, or subject to entry on land warrant.

Where purchases were made of Indian reservations, either by individuals or colonies, the entire body of such lands, with the exception of the alternate sections Nos. 16 and 36 of each township, have been hitherto kept out of market, waiting, doubtless, for the progress of railroads, and the consequent increase of prices. In the spring of 1870 we shall see, however, nearly every acre of unoccupied land in market. The rule prevailing with the railroad companies is to sell lands as their prospective roads progress. Besides, agencies are now established for the sale of Indian lands, purchased by individuals. These reserves, of both kinds, have greatly delayed the settlement of Kansas, but the cause is soon to be removed, so that every person can pay his money and take his choice.

Most of the railroad lands are unoccupied. There are vast tracts of this class where for miles not a house can be seen, the settler choosing rather to "read his title clear" before locating or making improvements.

The policy of all railroad companies toward actual settlers is more than friendly; it is parental. The price asked by them for lands will not average one-half of their worth. Lands are far cheaper at the appraised rates, with a railroad, than at $1.25 per acre without it.

The settlers who makes improvements, and determines to make and maintain a home, will not only be protected but aided by the company.

There are now fifty thousand homes in Illinois, along the line of the great Central Railway, made permanent and prosperous by the sale of granted lands on favorable terms. The same is true, to a large extent, of the lands sold by the Hannibal and St. Joseph Railroad Company, Union Pacific, Kansas Pacific, Central Pacific, Neosho Valley or Southern Branch Railroad, Leavenworth, Lawrence and Galveston, Atchison, Topeka and Santa Fe railroad. The Missouri River, Fort Scott and Gulf railroad, and the South Pacific railroad, will pursue a similar course as soon as their lands are ready for sale, probably by the 1st of May.

Upon railroad lands, the actual settler is always the preferred customer. He need not fear being dispossessed by any man. Those who have ventured upon these lands are encouraged to do so with the positive assurance that their claims will be first heard and allowed. The only rational objection is, that these lands will be sold at prices much higher than more distant lands.

Let us anticipate a few years, when the main railway line, now in progress, shall have been completed to the Gulf of Mexico, and

southwest and west to and across the Rocky Mountain range to the Pacific.

Consider also that the domain of arable soil is limited; that Texas, Indian Territory, Eastern Kansas and Nebraska, are the western limits of farming lands, until we reach the mountain slopes, and that with every year this class of land is diminishing; and one can readily explain, not only the immense emigration settling mainly toward the west and southwest, but also, the firm prices of lands maintained and steadily increasing every year.

We are no prophet, but it is easy to foresee along these extensive railways now threading Kansas and Western Missouri in all directions, a hundred thousand new, happy and prosperous homes and farms; which to-day are open, unfurnished prairie; and besides, but less in importance, a thousand thriving villages and cities; all the ripening fruits of the generous policy of our railroad system.

To build a town or plant a colony, and establish society with schools, churches, and courts, this is the work of a day, instead of years.

Under the modern railroad regime it is an immediate creation, instead of the slow process of pioneer life, with its struggles and endurance.

The Kansas Pacific Railroad, now nearly five hundred miles long, runs through the State from east to west. The Central Pacific Railroad extends over one hundred miles. The Denver and St. Joseph Railroad is progressing. Besides these, there are branch roads being built. The Topeka, Atchison and Santa Fe Railroad is completed beyond Burlingame, and the Neosho Valley Railroad is completed to Emporia, on its way, probably, to Chetopa, having a branch from Humboldt to Fort Scott. The Leavenworth, Lawrence and Galveston Railroad is running to Garnett, seventy miles south of Lawrence. The Missouri River, Fort Scott and Gulf Railroad is completed to Fort Scott, and will reach the boundary of the Indian Territory in April or May. The railroad from Lebanon to Fort Scott will doubtless be completed at an early day, and also a railroad from Sedalia, Mo.. to Fort Scott, which has already become the leading town in Southern Kansas.

In addition to these attractions, Kansas is free—not merely free from fetters, recently loosed, but free, liberal and friendly in the spirit of her citizens. Her laws are beneficent, her school system perfect, her taxation light.

Upon her soil was decided the great battle for freedom which preceded the lesser but more sanguinary storms of war. It attracted the best men of the Republic, who are still the guardians of that commonwealth.

PROCEEDINGS

OF THE

MISSOURI STATE

HORTICULTURAL SOCIETY

AT ITS

ELEVENTH ANNUAL MEETING

Held at St. Louis the 11th, 12th, 13th and 14th of January, 1870.

PROCEEDINGS

OF THE MISSOURI

STATE HORTICULTURAL SOCIETY,

AT ITS ELEVENTH ANNUAL MEETING, HELD IN "THE TEMPLE," CORNER OF FIFTH AND WALNUT STREETS, ST. LOUIS, MO., ON TUESDAY, 11TH JANUARY, 1870, AND THREE FOLLOWING DAYS.

The Society met at 10 A. M., the Rev. Chas. Peabody, President, in the chair, and Wm. Muir, Secretary.

The meeting being called to order, the President introduced the Rev. Dr. Post, who engaged in prayer.

The President next introduced the Hon. Mayor Cole, who welcomed the Society to St. Louis in a very appropriate address.

Mr. President and Gentlemen of the State Horticultural Society:

It affords me pleasure in being permitted to welcome you to our city—coming, as you do, from different portions of the State, and representing, as you do, Horticulture, that branch that is the life-blood, as it were, of our country. I recognize in your Society one of the greatest and most sublime of all the societies of our country. In your deliberations you try to lighten that law of labor placed on our parents in the garden of Eden.

You have directed your attention to that noble branch of industry so admirably calculated to elevate the soul and mind, and thus the more completely feel and know that divine influence, that, which guides and controls all things. While you are engaged in these delightful labors, you may feel that you are engaged in performing the noblest charity to man, for horticulture is the twin-sister of virtue and religion. There is certainly nothing better calculated to cultivate the mind and heart of man than cultivating fruits and flowers.

Horticulture is as old as man himself, and goes hand in hand with intelligence and religion. All through the history of the past, we find that nations have been more or less distinguished by the attention which they have given to the cultivation of the fruits, grains and flowers of the earth. Those nations which have given the greatest attention to horticulture and agriculture, are those that have ad-

vanced to the highest stage of civilization and intelligence. We observe that as the pursuit of the culture of the soil declined, Rome declined, while on the other hand as the British empire advanced in horticulture, they rose in character and national greatness.

I welcome you to our city to hold your eleventh annual meeting, and recognize in your deliberations a blessing to our State and country, and in the discussion of the subjects that will come before you, bear in mind that that alone is desirable which tends to beautify and adorn the pathway of life. As a Horticultural Association there is no dead past to bury its dead. I sincerely hope that harmony and good feeling may attend your session. I observe that in your meetings there is always harmony and good feeling, no "bickerings and bitings," no *political* or *sectarian* or other *axes to grind.*

Trusting that your labors will be productive of the greatest results, such as every citizen may feel proud of, and proud of the men who bring them forth, I now leave you to the work you have in hand.

President Peabody thanked his honor, the Mayor, for his kind words of welcome. We come with fruits and flowers to greet you, and to discuss their culture in your midst, and hope by earnest application to our calling to merit the high encomium you have accorded us.

The actual practical effects of the action of horticulturists compare quite favorably with those of any other association in behalf of the interests of the State, and while in merely political and sectarian assemblies, there is too frequently bitterness and animosity among horticulturists, there is a vast amount of true public spirit.

The President then delivered the following

ANNUAL ADDRESS.

The Israelites of old celebrated an annual festival; they came from their homes on mountain top and hill-side, from the valley and from the sea, up to the sacred city, intent upon a single object.

In like manner, ladies and gentlemen, have we come up here to-day to our yearly gathering—to our annual festival. Animated by common impulses, and united by kindred pursuits, we find ourselves once more together face to face. We are here also once more in the presence of that stern but invaluable schoolmaster—the experience of another year.

Permit me, first, to express the abundant gratification of every member of the Society, that we are permitted at last to disengage our meetings from yonder halls of justice, where for so many years we were wont to assemble to discuss horticulture amid associations of courts and juries. In the midst of such surroundings, "where men alone do congregate," we have, at our meetings heretofore, looked in vain for the animating presence of woman, whose tastes and habits, whose aspirations and sympathies, are quite as much in accord with the harmonies of our beautiful pursuit, as those of the stronger sex. Let me also express the universal satisfaction that we can meet to-day

in this beautiful "Temple," reared and dedicated to public single enterprising citizen of our noble city—a monument in itself of beauty unsurpassed, and a fitting spot for considering the grandeur and beauty of nature.

In casting about for some theme on which, at this opening hour, I may occupy a little space, I have selected as appropriate and timely,

HORTICULTURE AS A PRACTICAL PURSUIT.

Theory and Practice.—Almost everything in this world has a theoretical side and a practical side. Accordingly horticulture has two sides. A good many people are practical horticulturists. A very small number have both the theoretical and practical combined, but the number of theorizers on this subject is very large indeed. It is a very easy matter for gentlemen or ladies of leisure, with a little knowledge of books and a fair ability to write, to develop the most beautiful horticultural systems. They make all the pathways of this pursuit both attractive and easy. But he who enters earnestly upon it will find that he has to do with a thousand things which his book man never told him, and which, perhaps, his book man never knew. He comes at once into the presence of facts and realities. He has to handle soils and slops; rain fall and sunshine; rot and mildew; manures and fertilizers; colds and frosts and summer heats; bugs and worms, and insects and depredators of every sort, from the centipede and the quadruped down to the lowest and meanest of the whole tribe, viz.: the sneaking biped.

When a man gets on fire with enthusiasm for the country and for rural pursuits, with a heart all aglow with a full blown love of horticulture, he sometimes makes grand mistakes. If he possesses only that knowledge on this subject which he has derived from books, and is fully persuaded in his own mind that he knows it all, and that nobody can teach him anything new, he often makes a grand failure. After a while he finds himself among the *commonplace realities* of orchards and vineyards and gardens. He seems to himself to be wandering about in some other realm, far less attractive and lovely than his horticultural dreams had led him to anticipate. The result often is that he abandons all his expensive improvements and years of toil in supreme disgust.

Value of Books.—I am not opposed to books. I believe in books—in book-farming in a certain sense, and in book-horticulture. Well digested books on these subjects, full of facts and correct information, are indispensable. So are books useful on financiering, on banking, on mercantile law, on the manufacture of iron, on building ships or houses. But where is the man so familiar with books on these topics, that without any pratical knowledge he can manage a bank or a mercantile house, or smelt iron, or build a steamboat? A man may, by the help of engravings, and a little knowledge of anatomy, of the extensor and flexor muscles of his arms and legs, get a

pretty good idea of the art of swimming without ever having been in the water. But if you see him, under the conviction that he knows already how to swim, diving off into a deep pond, I advise you at once to take off your coat, and for humanity's sake stand by ready to pull him out.

As a man must first go into the water himself before he can become a swimmer, so also you must first roll up your sleeves, put your hands into the dirt, and watch nature's wonderful operations with your own eyes before you can understand practical horticulture.

Everybody can have a garden.—There are no letters patent to chain up this beautiful art, or to restrict it to a chosen few. All classes may cultivate it. Whoever can get access to earth, air, water and the sunshine may pursue it. The man of wealth may have his suburban villa. He may adorn his grounds with evergreens and walks and fountains; with clumps of shrubbery here and there, and parterres of flowers. The farmer also may have his garden—not that patch of ground behind his house, surrounded by a rail fence, where a few cucumbers and sickly hills of potatoes seem to be waging unequal battle for existence with weeds and thistles, but a real garden, laid out and cultivated not only for utility, but for the culture of his higher nature; not only such as will pay him for his toil in dollars and cents, but also in the coin that will be current in the higher spheres.

The clerk, or the young man commencing business for himself, who has just taken the wife of his choice to begin a home on a twenty-five foot lot in the suburbs, may have his garden. There is ample room in that little yard in front for a clump of evergreens and a few vines—for some rose bushes and a bed of verbenas. These will cost less than half as much money as a box of cigars. I seem to hear that little vacant spot calling loudly for cultivation; asking imploringly for the hour before breakfast in the morning, which is now spent in yawning and idleness. Here are all the materials and opportunities at hand for making that little spot a small Tower Grove or a miniature Chatsworth. Let the leisure or the idle hours be devoted to it, and it will be done.

Every householder in town or city, who has a little yard in front or rear, can have a garden. Those old barrels and piles of coal ashes which now encumber and disfigure the back yard, may be made to give place to forms of utility and beauty. The peach, the nectarine and the vine, all rejoice, like the domestic animals, in the presence of human beings and human habitations. Even the Black Hamburg and the Golden Casselas, and other foreign grape vines, will climb around your door and up the sides of your house yielding their delicious clusters, while they utterly refuse to do the same thing in the vineyard and the open field.

If you have not even a square inch of front yard or back yard, you may have a garden. Nebuchadnezzer, of old, invented a method

He hung his gardens high in air, so that at a distance they appeared like enchanted forests above the din of old Babylon. The same thing can be done on a small scale before the parlor window, or on an open balcony. Who shall deny even the humblest householder, the luxury and joy of a flower stand, which only requires water and air, and sunshine, with a little pleasant care, to make it a thing of beauty and a joy forever."

Why people dwell in cities.—Just here a grave question forces itself on our minds. Why should such a large proportion of the human race spend all their mortal days within the pent up dwellings of the city? A proportion vastly larger than seems necessary to meet all its mercantile or industrial requirements. This question involves problems too vast to be brought into this address. Some are bound to the city on account of its social life and superior religious advantages. Some for the sake of its amusements. A vast number on account of the real or imagined facility for acquiring wealth. Many have a high regard for, and consider quite indispensable, its fashions and conventionalities, and cannot live without them. The poor, the idle, the wretched, the vicious reside there because of the facilities for vicious indulgence and for the commission of crime, and perhaps also sometimes with the idea of finding ready assistance from the benevolent in the hour of need.

Cities necessary.—But whatever motives or combination of motives may serve to mass so many human beings for a lifetime into such close quarters, this state of things has been the same in all ages. Cities have been, all through the history of the past, the headquarters of philanthrophy and religion, of science and learning, of arts and arms. They seem to be a necessary part in the working out by Divine Providence of the grand problem of human destiny. Their existence, and the large wealth which they develop, are quite necessary to the prosecution of the higher arts of horticulture. They are filled up with those who are consumers, but not producers. They afford thus a ready market for all horticultural products. They stimulate also, especially in their immediate vicinity, the cultivation of landscape gardening, and the production of fruits and flowers. Let none of us, therefore, who prefer to make our dwelling place beyond the dusky precincts of the city, quarrel with those who choose to remain in it. We entertain not a doubt, but that hundreds of those now suffering for wealth or for a bare subsistence, up and down those reeking thoroughfares, could better fulfill life's great issues, both for themselves and their children, by undertaking rural pursuits. But this is a free country and every man has a right, provided he behaves himself, to dwell where he pleases, and to engage in such occupation as he may choose. He will, doubtless, pursue that calling which in his view will be the easiest and most direct road to competency and independence.

Will Horticulture pay?—This leads us to an important question.

What is the value of the pursuit of practical horticulture as a means of livelihood? This is the great question that enters largely into all our plans and undertakings. In giving a suitable answer and solution to this question, it may be suggested that this pursuit is governed by much the same laws as prevail in every other calling. In all the occupations which absorb the activities of mankind some make it pay, and some do not. Not every doctor, not every lawyer, not every merchant or manufacturer or miner succeeds. Indeed, in all these callings failures are quite common, but in all there are some who achieve success. The florist, the gardener, the vintner, the pomologist all stand in the same category as the others. Some meet with success, others with failure. Does a man need experience in order to manufacture flour? So he also needs experience in order to raise apples. Is shrewdness requisite in a man who buys and sells on 'Change that he may make money every time? So it is also in him who cultivates grapes for market. Must a merchant have enterprise and pluck in order to stem the tide of competition and pay his expenses? So must he who produces cabbages for your table or bouquets for your parlor. You do not advise an indolent, ignorant, sickly, thriftless man to become a lawyer, neither do I advise such a man to go into horticulture. In this calling those who are careful, shrewd, clever, quick to learn and industrious will succeed and make it pay. All others will fail.

Law of Supply and Demand.—The products of Horticulture, in the prices which they are destined to command, must inevitably follow the same laws as all other commodities. Equilibrium is one of the fundamental laws of trade. All prices are regulated by supply and demand. You cannot force an article on the community when it is not wanted, any more than you can make a man eat another dinner when his stomach is satisfied. You cannot sell your peaches at a remunerative price when the market is glutted. There are certain great staples of the world, such as wheat, cotton, iron, &c., which are always in demand, because they are articles of prime necessity, and yet, under the law of supply and demand, even these often fluctuate with great violence. The products of Horticulture are subject to much greater fluctuations, because they are generally articles of luxury. It is often the case that an article of luxury will work itself into general consumption, and thus become after a while almost an article of necessity.

Fifty years ago, ice, even in climates where it is produced, was seldom preserved for domestic use, and in warmer climates and in the tropics it was scarcely known. But now in every town and city of our land, and all over the world, from New Orleans to Calcutta, it has become an article of necessity. So it will be with the grape, that most delicious and healthful of all fruits. If it improves from year to year in quality by the introduction of new and better varieties, its consumption will increase almost indefinitely. As a general rule the

supply of anything valuable in horticulture increases the demand, and he who anticipates the public wants and is most prompt and ready to meet them will reap the largest reward.

The Law of Compensation.—But there is another law, prevailing especially in the realm of horticulture, which may be called the law of compensation. If on your grounds there be this year a partial failure in one direction, the same causes may produce abundance in another direction.

If a product only partially fail, that part which is saved and sent to market will secure a better price on account of the scarcity. If destructive insects in one season abound and inflict great damage upon the maturing fruits, their very abundance will bring into active existence another set of insects which may not only destroy the depredators, but prove of lasting benefit. Again, if your orchards or vineyards are this year robbed of the promised fruit by an untimely frost, you will lose the fruit, but the tree or the vine will be enabled on that account to make a more vigorous growth, and prepare itself for greater achievements in the future.

Increase of Enemies.—But there is in practical horticulture one discouraging feature. It seems now to be a fact, pretty well established, that the increase of vineyards and orchards and gardens in a certain locality has a tendency to give increase and activity to the diseases and insect enemies which are so destructive. In this direction, gentlemen, to those of you who prosecute this part of horticulture, is the great battle for success to be won or lost.

Let energy and perseverance, under the direction of skill and science, be brought to bear upon this great evil, and it will in time be overcome.

But in meeting difficulties and conquering them, as well as in all our toils and triumphs, let us not fail to recognize the hand of Him, who gives the rain and the sunshine, and who can cause "the wilderness and the solitary place to be glad for them, and the desert to bud and blossom as the rose."

REPORTS OF OFFICERS.

The Secretary made a brief verbal report, showing that the several committees of the Society covered the whole circle of operations. No new facts worthy of special notice had presented themselves.

The Treasurer presented his annual report showing a balance on hand of $39 35. The report was referred to a committee consisting of Messrs. H. T. Mudd, T. W. Guy and Dr. Morse, who subsequently reported the account correct.

On motion, the following were adopted as the hours of meeting, 9 A. M.; 2 P. M.; 7 P. M. Adjourned.

TUESDAY AFTERNOON.

The reports of Vice Presidents on the state of horticulture in their respective districts:

FIRST CONGRESSIONAL DISTRICT—REPORT OF MR. J. M. JORDAN.

Mr. President and Members Missouri State Horticultural Society:

It is made the duty of each Vice President to lay before the Society at its annual meeting such information as he may deem of interest to the Society, as well as suggestions for future operations, together with a review of the past season. Horticulture in Missouri is progressing rapidly; many are the acres planted to fruit the last year, and very many that for the first time gladdened the hearts of the owners by a beautiful return of fruit; while those orchards and vineyards of more mature age, did not disappoint their cultivators. There are many engaged in horticulture that complain of the small returns for their produce. Transportation, selling and commission, should be worthy of our consideration. There is evidently a want to be supplied in some form to give the consumer the fruits of the orchard, vineyard and garden, with less expense in transportation and thereby pay the producer a better price for his commodities. The real value of any article is better obtained when we compare it with other articles. Now the price of fruit in our market has been better than many other articles. A bushel of apples has been worth as much as a bushel of wheat or corn. We can now exchange a barrel of apples for a barrel of flour.

But while it only costs about 20 per cent of the price of wheat in our market to bring it from the producer to the consumer, it costs about 50 per cent of the market price to handle fruit, I am of the opinion that we pay too much to express companies. We could send our fruits by common freights at much less prices, and very often in the same time. As this Congressional District (the 1st) does not contain many orchards, I cannot be asked to go into the minutia of horticulture. I will only say that a branch of horticulture hitherto very much neglected, is now receiving much attention. I speak of the cultivation of ornamental trees and plants, and could our streets be relieved of the limestone dust, we could grow many more fine shade trees and beautiful plants; this I believe will be done. The last ten years I have been identified with the horticulturists of St. Louis, and I can truly say we are progressing with a steady, healthy growth.

SECOND CONGRESSIONAL DISTRICT—REPORT OF T. W. GUY.

Having been unable to get enough reliable statistics from which to make up such a report of the progress and success of fruit growing as I conceive is called for, from one holding the office you were pleased

to confer on me, I can only report from the limited personal knowledge I have of my own neighborhood and county:

There is still an increasing interest in horticulture in its various branches in the Second Congressional District, and many new plantations of the different varieties of fruit are being made especially in Jefferson county. The apple did well generally this year, as witness the very fine display at the St. Louis Agricultural and Mechanical Association, and the Horticultural Fair held this last fall, and those owning orchards in my neighborhood, and those about to plant, are very much encouraged. Pears, as far as we have tried, or seen tried, give promise of considerable profit to those cultivating this fruit. The orchards in my neighborhood are all young and just beginning to bear, but judging from the few old trees and the fine growth of the orchards lately planted, I think our section of the State will be found to be favorably situated to produce this delicious fruit. Peaches were almost a failure this year, owing to various causes, but principally the curculio, and we have either got to give up the peach, or go to work manfully and whip the fellows, and no half-way work will do, for already it is almost impossible to find a specimen of this fruit that he has not punctured. Of cherries, plums and quinces, not many are raised. Grapes were very variable this season, rotting under every method of culture, and, again in the same neighborhood, and under the same system, showing perfect fruit with scarcely a single berry being decayed, so that all our theories of the cause of rot are completely upset. Small fruits were abundant, and their culture greatly increased.

A word on marketing fruit; much of the profit in fruit culture depends on the manner in which the fruit fs gathered and packed for market, and the failure to put two or three more specimens into a box may spoil the sale of the lot, as I have several times witnessed the last summer and fall.

F. F. FINE, VICE PRESIDENT OF THE FOURTH CONGRESSIONAL DISTRICT.

Mr. President and Members of the Mo. State Horticultural Society:

As Vice President of your Society for the Fourth District, I submit to your Society the following report. I will state that in this part of the State horticulture is largely and rapidly on the increase. The disposition amongst the people to plant fruit trees of all kinds surpasses any thing I have seen heretofore. The apple of which this section of Missouri is the home, gave a very large crop, in fact too much of one, and the consequence was the fruit was small, but of good quality. Only about one-third of the crop was saved before the hard freeze in October, yet enough to keep the price so low that all who wish can eat apples till they grow again. The apple here is troubled very little with insects or diseases. The varieties most popular here are Rawle's Janet, Winesap, W. W. Pearmain Ben Davis, N. T. Pippin, as winter varieties.

Pears are being planted to some extent, and promise well. There were a good many in fruiting this season, showing good size and fine quality. As to disease, we are not exempt. That pest, the blight, the greatest obstacle to successful pear culture has made havoc with some orchards here, although one man, who has an orchard of seven hundred trees has lost but one in four years.

Peaches seem to be at home here, and seldom fail to give a crop, although most trees in bearing are seedlings. The past season gave a moderate crop of fine sized peaches, of good quality, and exempt from any defects whatever.

But few of the finest varieties of cherries have fruited here yet, and the past season was almost an entire failure for all kinds.

Plums grow wild in great abundance. The cultivated varieties grow also, and are beautiful. But few are left by the little Turks to ripen.

Grapes, as far as tried, do well. Such as Concord, Hartford, Delaware, Norton's Clinton, Northern, Muscadine, etc. Although the rot prevailed to considerable extent the past season, especially with the Concord, yet enough were left to make it a paying crop. Other varieties did not rot as much; some not at all. The wild grapes were affected with the rot the past season so as to be a total failure, something I am told which is seldom known here.

Grape planting has nearly doubled itself the past season. There are not less than fifty acres in Greene county, and about one half fruiting this season. Webster, Wright, Dallas, Polk, Lawrence, Newton, and Jasper are planting more or less. A. J. McCrackin, one of the oldest horticulturists in the county, has made considerable wine the past season from his vineyard. Nearly all of the newer varieties are being planted here for trial.

The currant does not appear to be at home only where it is protected from the rays of the sun. The gooseberry does better, and good crops are gathered. Blackberries, raspberries, and strawberries grow spontaneously in the woodland and prairie, so there have been but few planted, except of the strawberry, which gave a splendid crop the last season. In conclusion, I may say that the prospects for horticulture in this district are very encouraging, and the time not far distant when this section will be one of the greatest fruit regions of the West.

FIFTH CONGRESSIONAL DISTRICT—REPORT OF F. A. NITCHY, VICE PRESIDENT.

Mr. President, the friend who proposed and the society who elected me as their representative in the Fifth Congressional District have not been very fortunate in their selection. To do full justice to the position, and to reward the expectations of the society, I should have traveled through every one of the thirteen counties which are comprised in the district, extending from the mouth of the Osage, in the center of the State, to the remote border of Missouri in the West.

Or I might have at least corresponded with the prominent horticulturists in the flourishing settlements of the Osage Valley, of the Black and Larmine Rivers. Neither of which I have done. Horticulture is expected to flourish naturally, to some extent, in the older counties of Cole, Cooper and Johnson. Of no less importance is it with its store of observations and experience in the younger settlements of our western counties, where the energy and thriftiness of the immigration is planting orchards and vineyards almost as soon as the first crop of corn has been secured. But when I attempt to present some account of what has been done in this hilly, timbered county—Cole—in the immediate vicinity of the State Capital, it may, perhaps, pass for a representation of the state of horticulture in the other portions of the district similarly situated. For a general view I propose to speak of the (1) orchard, (2) small fruit garden, (3) vineyard, (4) the market garden, (5) the hop yard, and (6) the flower culture.

The orchard is a part of almost every old place; its apples and peaches being a source of income second only to the breadstuffs and hay.

Apples.—The trees come into regular bearing about the sixth year, and as yet we know no limit to their lives, that is of our approved varieties. Trees of thirty years appear strong and healthy enough for a full century. The varieties which succeed best are the Genetin (Janeton), the Henderson, the Newton Pippin, the Rambo, the Belleflower, in the order here named. The Baldwin, like many other Eastern apples, is a large fruit, beautiful to the eye, but lacking the flavor, the juiciness and the keeping qualities of the Baldwin of New England. Planting more orchards is evidently the rule of the day, for the by no means small nurseries of Messrs. Swift, Gregg, Wielandy, and perhaps others, cannot supply the demand, so that large orders are sent to Washington, Mo., St. Louis, Belleville, Ill., and Bloomington, Ill. After the trees have passed their third year, it is not difficult to keep them in thrifty growth, but their first years are causing anxiety to the planter. When their vigorous shoots of early summer should mature under the autumn sun, then the enemy appears. Thousands of grasshoppers will cover our fields, and destroy every leaf on the young apple tree, leaving it bare and an object of pity. The disheartened planter is glad to find the young trees budding and growing again the following spring, yet it cannot be denied that the growth of the tree has received a severe check. We implore our benevolent friend, C. V. Riley, the State Entomologist, to discover a remedy against this annual plague—some cannibal, perhaps, whom we shall pet and raise. Birds will do a great amount of destructive work among the grasshoppers. We ought, therefore, to protect them by a law, and have such law strictly enforced. Peach trees are less subject to attacks from grasshoppers.

The apple crop this last season was enormous. Mr. Railton, who has one hundred acres in orchard, has supplied all his home custom,

shipped a large quantity to St. Louis, and made barrels of apple butter, besides excellent cider and vinegar. The unexpected frosts of October 24th and 26th found many an apple tree yet unpicked—in fact, some of the Janiton's were not quite ripe, the season being late. The fruit injured by the frost has been almost all made into a very good cider.

Peaches.—For these the soil and climate of this county and its southern neighbors are not surpassed not even by the famous peach region of Egypt—extreme southern Illinois. Trees will commence bearing at three years from the seed or bud.

Which varieties will do best is still a subject for further investigation. Seedlings will gratefully bear every year, whilst the Early Crawford, Hale's and Troth's Early have proved so capricious as to preclude their being planted extensively. Already we have some varieties originated in this county, which are really good, reliable, early and prolific; they are now being propagated by our nurserymen (especially Mr. Wielandy) for further trial. The enemies of the peach are principally the borers; the curculio is not as yet so numerous here as elsewhere. Taking one year with another, the most profitable varieties are the seedlings. The crop was small the past season; of the finer varieties we had almost none.

Pears.—These are as yet grown to a small extent. The Seckle, Bartlett, Flemish Beauty and others have done very well thus far. The most successful grower of French varieties is Dr. Pondrom, of Jefferson City, an enthusiastic lover of flowers and fruit.

Quinces, Cherries and Plums succeed well, but are not very abundant as yet. The German prunes (Zwetchen) have for a number of years done splendidly, contrary to the tradition of Pennsylvanians and other eastern men.

SMALL FRUIT.

The culture of the *Strawberry* was for a while attempted on a large scale; soon, however, it was found that Egypt could beat us in our own home market. The plantations require more labor than we are willing or able to bestow. Hence, they were choked with the weeds.

The berries few and not large. The market for a good article is never glutted, but our experience seems to prove that there is no profit in raising them. The Wilson does best; next we have placed the Agriculturist, Triomphe de Gand, Fillmore. Jucunda is discarded.

Gooseberries, Currants and Raspberries grow well in properly shaded localities.

Of *Blackberries* we prefer the Kittatinny. It is hardy, prolific, and of good quality. There is yet, however, such an abundance of wild berries in our market that the propagated varieties are neccessarily limited.

Vineyard.—If the vicinity of Hermann, in Gasconade county, has

achieved the front rank among the vine and grape-growing sections of our State, notwithstanding the immense outlay of manual labor required to fit its rocky and barren soil for the culture of the grape vine; we in Cole county have a soil that can compete with our neighbors below, and have every fair assurance of success. Our soil is free from rock, is mellow, rich in humus as well as in mineral plant-food necessary for the full development of vines and grapes; the surface is sufficiently hilly to afford excellent situations for vineyards, without being so steep as to exclude cultivation by horse and plow. On the whole, as far as the natural requisites of soil and site are concerned, we are more favored than the vineyard regions on the Missouri below this point, and a fair encouraging state has been attained.

Messrs. Swift, Langerhans, Gundelfinger, Wielandy, Judge Krekel and others, in the immediate vicinity of Jefferson City, are already raising excellent crops of choice grapes. The public are becoming more advanced in their taste, so that the demand for a good grape is steadily on the increase. Dr. DeWyl, who is our county assessor, thinks that as many as fifty acres of vines are already planted, and will be in bearing in 1870.

The first vineyard of some extent was planted by Messrs. Langerhans and Gundelfinger. They raised principally the Catawba, or rather tried to raise it. Their ill-success with this variety has induced them to graft the roots with Concord, of which they had a good crop this year of very fine fruit; and the sweet, thoroughly ripe Concord grapes raised by Judge Krekel, Dr. DeWyl, Swift, Dulle and others are good enough for any fastidious epicure.

The Catawba is a failure in vineyards where the German method of close pruning is practiced; where it is "cut long" and no summer pruning is permitted, it bears handsomely, and the grapes are of the finest quality. So has Mrs. J. Hackney succeeded. So have others on their trellises in the city yards succeeded also.

Judge Krekel, who as a close observer and very successful grower of grape vines takes the front rank, tells of an incident illustrating the true method of close and of long pruning, and their different results. A noted writer on grape culture paid him a visit, and was shown by the Judge a portion of his vineyard, pruned and trained according to his visitor's treatise, it bore no fruit. "This other portion," explained the Judge, "is left to the care of nature all the growing season and is my *bearing* vineyard."

All our authorities on grape-growing insist that the peculiarities of any location determine the varieties which will succeed there. With this axiom in view, I have planted an "experimental vineyard" of about one-third of an acre. The past summer was the second after planting, and I give below the table of my observations. No summer pruning was done, and each vine was allowed to bear according to its size and vigor. Husmann does not approve of fruiting vines in the second summer; but mine were so strong, so luxuriant that I

risked the consequences. I obtained them from the Bluffton Company and, of course, they were good plants:

Varieties.	Wood.		Foliage. (Concord.)		Fruit. (Concord.)		Ripe.	Standard 10.
	Vigor	Health	Vigor	Health	Amount	Health		Quality. (Herbemont)
Roger's No. 7	5	9	5	3	.....	.....	.....	.....
Cynthiana	7	10	10	10	1	10	.....	.....
Ewing's Seedling	10	10	10	10	1	10	September 1	9
Roger's No. 4	9	10	8	8	6	8	" 12	10
Roger's No. 5	8	10	8	8	9	9	" 12	
Roger's No. 9	10	10	8	9	9	9	" 1	
Roger's No. 1	15	10	12	10	10	10	" 15	
Roger's No. 19	9	10	8	8	8	9	" 10	
Union village	9	10	8	8	1	9	August 20	
Cassady	4	9	8	10	.....	.....	.....	.....
Martha	9	10	10	10	10	9	August 25	9
Taylor	9	10	9	8	5	7	" 20	8
Golden Clinton	9	10	10	10	5	7	" 20	8
Delaware	9	10	10	10	9	8	" 20	9
Blood's Black	15	10	10	10	5	10	" 15	foxy.
Creveling	10	10	10	10	12	9	" 15	9
North Carolina Seedling	15	10	10	10	3	stolen	by birds.	
Maxatawny	8	9	9	9	3	9	August 20	9

The quality of the fruit will improve with the age of the vine, and I really think that Martha and Goethe (Roger's No. 1), Creveling and Delaware will come to equal the Herbemont grape in exquisite vinous sprightly juice.

Market Garden.—As long as building lots do not rise considerably in our (small) cities in price, so long will there be a large number of persons who will on half an acre, or sometimes an acre, in the blocks somewhat distant from the business centre of the town, raise vegetables for the market. The work is done chiefly by women and children, and the selling and peddling of the produce also falls to their sphere. Larger market gardens have, therefore, to struggle against a very lively and very cheap competition.

Only Mr. Wielandy has, with a good. deal of stubborn perseverance, established a larger market garden in this county. All of the varieties of garden vegetables found in the New York and Philadelphia markets are easily grown here, with the exception of celery, which we have not as yet seen in its glory. Potatoes might, perhaps, be mentioned in this connection; the principal crops of this year were of these varieties: Peach Blow, Neshannock, Miller, Goodrich, Harrison. The Early Goodrich suddenly shows the rot, although the tubers were dug when fully ripe, and the seed used was sound. This failing will terminate the culture of this much-puffed variety in this locality. The Early Rose has done well, and is of a better quality than the Goodrich.

Hop Yard.—There is one of several acres planted by Mr. Simon Kerl (the author), on his farm in this county. But, following the example of the man in the parable (Luke XIV), he has married a wife, and neglected the hop yard this year. There is a good home market for a considerable crop of hops, and now after the failure subsequent upon overdoing the thing (in hops as in wool), a fair profit may be expected from a steady culture of this vine.

Flower Culture.—Formerly, it was only Dr. Pondrom who excelled in raising numbers of the finest garden flowers, bulbs and pot plants. Of late Mr. Peterson, a professional gardener, has done a good work in erecting the green and propagating houses of Mr. Belch and Secretary Rodman, and in supplying pot plants, in company with Dr. DeWyl, at attainable prices. Thus a good beginning has been made in the decoration of city yards and windows, and the good example set by one is soon followed by a dozen.

The refining influence of flower culture at home will soon be felt in the increasing attachment of the children (and parents also) to the old homestead.

Horticultural Society.—A horticultural society has been in existence in Jefferson City for more than a year. It has held several meetings; published its proceedings; had a fair of fruit, flowers and grapes, which did credit to the exhibitors; and managed the exhibition of fruit, grapes, flowers and handiwork at our last county fair. It has not yet developed a Barler or a Hull, but its beginning was very auspicious, and in time it may become to Missouri what the Alton society is to Illinois.

REPORT FROM THE SIXTH CONGRESSIONAL DISTRICT FOR 1869.

GEO M. DEWEY, VICE PRESIDENT.

The counties comprising this district border mostly on the Missouri river; have rich timber soil and prairie in about equal proportion, and are well adapted to the growth of all the fruits common in this latitude. 1869 will long be remembered as the wettest season here since the first settlement of the county, yet most of the fruits did well.

Strawberries were fine, except where the beds were suffered to mat together. The stool method is the best, where fine fruit is the object. Wilson's is the variety most cultivated and most successful. Green Prolific has done well.

Raspberries.—A success where cared for, and not too many canes suffered to grow. The Black Cap and Philadelphia are principally cultivated. Davidson's Thornless has no special merit. While at Angola, New York, a few days ago, the home of the Thornless, I learned that this variety had a poor reputation in its own country.

Gooseberries do well when kept properly thinned, which is seldom the case. When neglected, in two or three years, it becomes a tangled mass, small fruit, mildew and death are the consequence.

Peaches are a very uncertain crop in this part of the country, it being just far enough south to start the buds during the warm days, and just far enough north for cold snaps to kill them. December the 11th, 1868, the thermometer was twenty degrees below zero for four hours, this finished the peach crop. On the 14th of March, 1867, the thermometer was at ten degrees below zero, killing the peaches, and so it is most every year. There were a few peaches last year immediately on the Missouri river. The borer is troublesome, and will kill every tree that is not looked after.

Apples were a great success in 1869. Every tree old enough to bear had on an overwhelming crop. The only serious drawback in the apple business is the ravage of the codling moth; probably one apple in every five had a worm in it. No very efficient remedy has been discovered for this moth. Still we entertain great hopes that, like the Colorado potato bug, it will soon disappear.

The most generally cultivated and reliable apple here for winter is the Janeton. The cold snap in October froze about twenty five per cent. of the apples, rendering them worthless for anything but cider. Apples sold during the fall from forty to fifty cents per bushel, a remunerative crop at that. Large numbers of trees are being planted, and we expect to find a market in the Far West. In Michigan we shall find a strong competition in the apple business.

Pears succeeded better this year than ever before; full crop of all kinds, and little or no blight. The Seckel and Duchess are considered the most reliable. Poor soil and some neglect in cultivation, after the trees are three or four years old, are relied on to prevent blight. With good cultivation and rich soil, the pear generally dies of blight before the eighth year.

Plums are generally destroyed by the curculio. Catching the Turk by sheets has not been very successful. A tree standing near my house, where the ground is always bare, and the chickens feed, has borne a full crop every year for five years. After supplying my own family, I have sold some five dollars worth every year from this tree, while the curculio destroyed all the fruit on the other trees. A man in Western New York informed me that he had succeeded in

raising plums by strewing the ground under the trees with salt; thinks the Turks' eggs are on the ground under the tree, and that the salt destroys them. Be this as it may, when he fails to put on the salt the crop fails.

Cherries succeeded better this year than common. The only trouble about the crop was the birds; but as they only take a cherry and go (and not like the grape birds, pick over a half-dozen bunches) we have plenty left. A board should be set up on the south side of tender varieties in winter, to prevent the sun's rays after cold nights.

Grapes.—There are about one hundred acres in grapes in this district. The principal varieties planted are Catawba, Concord, Norton, Hartford and Delaware. The Catawba produces a crop about every four years. It failed almost entirely this year, and made no good wood for 1870. Rogers' No. 1 will soon fill its place, being its superior in every respect.

The Concord rotted but little and made good growth of wood, ripened its fruit well, and is making a good wine. To those who object to its color, or taste, I will say, press the grapes as soon as gathered, and put one-fourth lbs. of crushed sugar to each gallon. The Norton has done well wherever planted, producing after the fourth year a large crop, and all that can be desired for a dark heavy bodied wine. This wine will keep where the temperature is above 70°, for months. Six hundred gallons of first-class wine to the acre, is but a moderate yield, and six hundred gallons of water sugared to 80°, added to the husks, will make a wine that will do any tired man's body good. The Delaware is doing well where it is well cultivated and not over-borne. I have never yet seen a rotten berry. A second-class wine can also be made of this grape, as recommended for the Norton; and whoever makes it, will wish he has more; the unfounded prejudice against gallizing will die with this generation. For the benefit of those temperance or over scrupulous persons I meet occasionally, I will give a formula for keeping wine sweet. Put some gravel in a funnel and about six inches of coarse sand, well washed. Run the must through this, and to every ten gallons add an ounce of powdered alum. I learned this *secret* from a Kelly's Island Vintner. As white wine is more saleable than red, much effort will be made to produce a good white wine. At present Rogers' No. 1 seems likely to be that grape. Grafting on old roots has been successful wherever tried, the grafts usually making fifteen or twenty feet the first year. But the same cannot be said in respect to grafting as practiced on the root for apples. In the fall of 1868, I purchased 1000 Clinton vines, and during the winter grafted them with Delaware scions, by the common cleft mode. The roots and scions were kept moist all the time, and as fast as made placed in a box and covered with damp sawdust and placed in the cellar. The wrapping was waxed cloth, and the stock and scion fitting neatly by making a shoulder on the graft. These grafts seemed to have formed a callous and no mould ap-

peared in the sawdust. About the first of May, when the ground had warmed some, I carefully planted them out; the bud swelled some and for a while I thought the grafting would prove a success. There was a plenty of rain and all that seemed necessary was done to make these grafts grow. But, alas! not one of them grew. My neighbor Redburn tried about the same number, with the same success. These grafts seemed to fail for want of nourishment; the stock not furnishing sap enough. The sap in the vessels in the stock and scion, may have been so dissimilar as to produce the result. The most important thing necessary to success in fruit culture, is a dry soil, the Cranberry being the only exception we know to this rule.

The Sixth Congressional District has a large amount of this kind of soil, all the virtue there is in trenching and subsoiling, is due to the drainage it produces. Dry feet will do more to keep the bark smooth on apple trees than all the washes, and make them utterly unnecessary. This was plainly visible to me in a trip I made on the east shore of Lake Michigan. The soil there is very sandy and dry, and the bark of the apple trees was as smooth as Russia stove pipe; no wash is even thought of there.

The report of the Seventh Congressional District—H. M. Vories, of St. Joseph, Vice President, is in incorporated in his report as Chairman of the *Ad interim* Committee.

REPORT OF O. H. P. LEAR, VICE PRESIDENT OF THE EIGHTH DISTRICT.

MR. PRESIDENT:—I beg leave to report the apple crop for this district badly injured by the frost, and consequently nearly a failure so far as pecuniary gain to the owners. Some varieties of apples were as fine this season as ever grew; and others, equally as hardy and productive other years, were a total failure. The Willow Twig is a fair illustration. Not more than one-fifth of a crop in my orchard. My trees are eleven years old, are set on ridge land, and the ground is sown in clover. The fruit on orchards to the west, similarly situated are about the same; but one-half mile to the east, on the same ridge, the Willow Twigs are as fine as ever grew. Winesaps in the first two orchards described are a failure—in the latter a partial crop.

Near Saverton, on the Mississippi second bottom, the Winsaps and Rawle's Janet are very fine, and in the same orchards the Willow Twig was an entire failure. The Ortley in some localities was a failure, and indeed, we might add, that it was a general failure in this section. Northern Spy and Peck's Pleasant produced a full crop of very fine apples.

The apple crop in Marion and Ralls counties cannot be estimated at more than a half a crop. The shipping price in this city was fifty cents per bushel, at which price a large quantity was shipped from this point. The frosted apples were largely used up for cider making purposes, thereby utilizing the greater portion of the crop.

The peach crop in this vicinity was a total failure, although we have in range of this market at least ten thousand bearing trees.

The pear crop was very light; our market being poorly supplied with choice, or even common pears. The majority of persons having pear trees are discouraged from further investments in that direction, on account of the blight. Still pear culture cannot be considered a failure in this county, as no one within our knowledge has given it a fair trial.

Cherries are not as extensively cultivated as they should be. Many varieties do well and are profitable to the owners; among which may be named the Early Richmond and Morello. The sweet varieties are not as profitable here as further east, but produce some very fine fruit; among the best we may name the Mayduke, Elton, Yellow Spanish and Napoleon Bigarreau. Small fruits are not as extensively cultivated within the range of this market, at the profitableness of the investment would seem to justify. A few of our farmers have small "patches" of strawberries but few of them have berries to sell and eat.

Raspberries, Blackberries and Currants, are sparsely cultivated, not because they do not pay; but from sheer carelessness and want of enterprise on the part of land owners. Mr. A. E. Trabue cultivates the raspberry for bee pasturage, and also for the market, and finds it a profitable crop.

The freeze on the 19th of October damaged at least one-fourth of the apple crop. The thermometer fell to twenty-six degrees, followed by two warm days. On the 22d the thermometer marked twenty-four degrees; the cold constantly increasing until the 26th, when it stood at eighteen. This summary seizure by jack frost, of the poor neglected apples, should teach our fruit growers to gather apples while the sun shines. Some cultivators shook down their apples thereby saving a portion of them. The Rawle's Janet will stand more freezing than any other variety.

In 1863, on the 22d day of October; the snow fell to the depth of three inches, and the thermometer marked twenty degrees. About four hundred bushels of my Rawle's Janets remaining unpicked, I shook them down during the freeze which lasted two days; the snow melted, the apples were gathered up and stored in large bins along side of the same amount of the best handled Janets that I ever saw. Both lots remained in the cellar until spring, with less than two per cent of loss, and no perceptible difference in the lots. This is not mentioned as an inducement for others to neglect their fruit, but as a means of saving it under similar circumstances.

The question might now be well asked, and carefully weighed: What have we learned from the late freeze? What varieties have proved the most hardy? Are our trees injured by being full of sap and leaves? Had the sap performed its whole duty before the freeze? Will not the sap in the green wood cause the bark to burst off from

many of the late growing varieties? If so, many trees will show their withered and leafless branches before the midsummer sun of eighteen hundred and seventy shall touch them with his heated breath. But shall we fold our hands and give up in despair because for the moment Pomona hides her smiling face and withholds her richest and most luxurious blessings? We say no! Never let it be said of horticulturists, "they are discouraged;" but rather let us gird on our armor anew and resolve to benefit by the experience of the past, and select such varieties, propagate such seedlings, and rear up such new fruits as are adapted to our soil and climate. Let us all strive to become better acquainted with our profession. Let our aim be to become masters of the situation and bring our knowledge into the orchard, field and garden. Let us properly instruct the rising generation in the cultivation of fruits and flowers. Let us call a convention of all those interested in this great work, impress upon our legislature the importance of the establishment of an agricultural college immediately, as the one great step in this most important work. Let our common school law be so amended as to compel the teaching of some of the more important branches of agriculture, horticulture, botany, geology, etc. Let our newspapers keep this subject before the people, let us all talk horticultural improvements, make notes on experiments, etc. Thus we may expect to go onward and upward in our calling until we arrive near perfection.

REPORT OF THE NINTH CONGRESSIONAL DISTRICT, A. E. TRABUE, OF RALLS COUNTY, VICE PRESIDENT.

About the first of December, 1868, we had a cold snap that dropped the thermometer in a night from 40° Fah. to 16° below which destroyed all half hardy buds. Not one peach bud out of fifty thousand survived. During the past summer, in consequence, I did not see more than a dozen peaches on a tree anywhere in this neighborhood. Apples being of a hardier nature, survived the attack, and we had a fair crop. However, about the middle of October we had a spell of severe weather (16°), which froze all exposed fruit, rendering the majority of those ungathered valueless for anything except cider. Those who understood the thing, knocked their apples off before the sun had power to thaw them, and thus saved their crop. Hardly any variety of apples is injured if thawed out gradually; consequently, if there are a few inches of snow on the ground when apples are frozen on the tree, if they are immediately shook off, their own weight buries them in the snow, and that is sufficient.

The budded fine plums, as usual, were taken by the curculio, but as he charged nothing more for his services, we were very willing to quit even. We therefore consider the curculio a born gentleman. If we raise anything, he takes it all and says nothing. But then, again, if we raise nothing he charges nothing, and we would like to square with all our other hands on the same terms, the past year. I

think we ought all to plant the Chickasaw plum. It seems invulnerable. Had fine crops of cherries; had any quantity of small fruits the whole season.

It is a little astonishing how rapidly consumption is gaining on production in the line of small fruits. Hannibal, that ordinarily consumes not more than fifteen hundred gallons, last summer took twenty-five hundred gallons, and did not seem much crowded. The Kittatinny blackberry bore fruit until frost. Nearly all varieties of grapes rotted badly, the Delaware notably excepted, but this last cast its leaves, and it failed to ripen its fruit. It withered green on the vines. Nine-tenths of our grapes rotted. So wet a summer has hardly been known here before. We had a fair fall, however, which caused what grapes that were left to ripen up well. The must of the Concord weighed seventy to seventy-five.

Mr. Secretary, I find I cannot be present at this meeting. Is not the culture of the honey bee a branch of horticulture, not technically or truly, but *rurally*. I would like to offer this resolution, if not much objected to. It is getting to be a heavy interest. Please offer it for me:

Resolved, That the chair shall appoint a standing committee of three, to be known as the Committee on the Honey Bee and its Products, whose duty it shall be to report to each succeeding annual meeting of this society the state of bee culture in the State.

The resolution of Mr. Trabue was seconded by Dr. Spalding, and adopted.

Mr. J. M. Jordan introduced a resolution, instructing the Committee on Wines to report on those of 1869 as distinct from the others. After some discussion, the motion was lost.

An address was then delivered on "Plant Life," by Wm. Muir:

In introducing the subject, the speaker said it was impossible to perform the operations required in horticultural pursuits without an understanding of the laws that govern plant life. What constituted this *entity* was not so much the point in the discussion as the conditions with which the principle of life associated itself. The principle of vegetable life is stored up for future use and development in seeds, buds, bulbs, tubers, leaves, etc. The beautiful, highly artistic forms in which the embryo is infolded was mentioned. The growth of the hyacinth in the glass was given as an example of the mode of this development that was easily appreciable to the eye, as first putting out its roots, then sending up the stem and flower with all their color and odor; but it was found that the want of a new supply of plant food was felt. No material was stored up to continue its existence, and the hyacinth perished by exhaustion unless it could be placed in the soil at once, and even then, if it lived, it could not bloom the next year. The common potato and also the Chinese yam were given as familiar illustrations.

Vegetable motion, in some instances almost amounting to sensation, was mentioned, of which the Sensitive Plant and the Fly-trap

furnished apt illustrations. Instances of motion with indications of purpose, or will, were found in the tendrils of the grape vine and the twining of the bean, etc.

Motion in search for food was illustrated by the walking fern and the common black cap raspberry.

Vegetable life was not only locked up for a future time or forthcoming conditions in the seed, but in the plant itself. The rose of Jericho was a native of the sandy wastes, which were subject to wet and dry periods, and during the scorching season not only was everything dried up, but the violent winds blew the sand from around the roots of the plant, which was afterwards borne about with violence from place to place; but, under the reviving influence of rains, after months of time and miles of travel, recovered its powers, took root and grew on as before. The western regions of this country offered an even more striking example in the resurrection plant, a native of New Mexico and the neighboring regions, specimens of which were gathered from the plains, carried to New York, thence to Cincinnati, St. Louis, and to Kansas, as dry as dust, and, as was shown, could be crumbled up as snuff, when placed in a vessel of water, with perhaps a porous limestone rock, revived and lived and performed its functions as if nothing had happened. No wonder it was called the resurrection plant. Can we wonder at man believing in another life or immortality with these teachings and illustrations of nature?

A seedling apple tree was exhibited to illustrate the manner in which the plant food for its future elongation and the development of the fruit is stored up in the root, stem and branches of the tree; how the last-formed buds and young wood were most active; how these principles were to be applied to the pruning and the propagation of plants; how that not only seeds and buds, but leaves and other appendages could be made, by supplying favorable conditions, to become individual plants.

Specimens of hyacinth, resurrection plant, walking fern, etc., were kindly furnished for illustration by Kern and Michel of St. Louis, and C. Connon of Webster.

REPORTS OF AD INTERIM COMMITTEES.

H. M. Vories, of St. Joseph, chairman of committee for the Northern District, reported:

The past season, although it has, in some respects, been unfavorable, has in the aggregate been a successful season with horticulturists throughout the Seventh Congressional District of the State, or I may say throughout the northwestern portion of Missouri. Some portions of the district, in the early part of the summer, suffered considerably from the grasshoppers, or what are more properly called the "locusts;" but they disappeared in the fore part of July, after which time the crops of fruit and vegetables did exceedingly well.

The crop of apples was never better, either as to quantity of the yield or as to the quality of the fruit, in the past twenty years. Peaches proved nearly a total failure. There were only a few in the most favored locations, and they were generally seedlings. The buds were generally killed in the fore part of the previous winter.

The cherry crop was better. The May duke, the early Richmond and other Morello varieties produced fine crops of fruit; but, as usual, the Heart and other sweet varieties proved almost an entire failure. A few of the Yellow Spanish and Governor Wood varieties were obtained, but not enough to make it an object to cultivate them, either for family use or for market. I believe it is almost, or quite, universally conceded that the cultivation of cherries (except as to the Morello or Kentish varieties) may as well be abandoned in this portion of Missouri.

The pear crop was entirely satisfactory last season, so far as healthy bearing trees could be found; but the blight has been so destructive upon the pear trees in this part of the State for the last few years that but few bearing trees, comparatively are left, and it is now beginning to be feared by many intelligent fruit-growers that unless some remedy can be discovered for the blight, pear culture will have to be in a great measure abandoned. Yet where trees can be preserved from blight, there is perhaps no country where pear trees bear larger crops, or more beautiful and delicious fruit.

Grape culture in this portion of the State the past season, as is usual, has been entirely successful. The Hartford Prolific, Norton, Clinton, Concord, Ives and Delaware have proved entirely hardy and productive.

The Delaware, in some localities, dropped its leaves to some extent. This is the only exception to entire success in the culture of the grapes above named in this locality.

The Concord in Mr. Jacob Maidenger's vineyard, at St. Joseph this season produced over twenty-two pounds of grapes to the vine, this being an average for about one acre of vines, the fourth year from planting.

This yield is not deemed to be extraordinary for the Concord when well cultivated. There are a number of other varieties of grapes which have been cultivated here to some extent, most of which promise well, but it is not permissible to particularize further in this report, or it would be too long.

The strawberry crop last season, where it was not destroyed by grasshoppers, was very abundant, and the fruit most excellent. The Wilson's Albany is the leading variety cultivated here, but the Agriculturist did exceedingly well and is growing in favor. Quite a number of other varieties have been cultivated here in a small way, some of which promise well.

There have been but few raspberries or blackberries cultivated

in this part of the State. The blackberries have not generally done well, but last season the Doolittle and the Miami raspberries produced finely, and it is believed that they may be profitably cultivated, and perhaps other varieties might do as well; but they have not been sufficiently introduced to speak with certainty of their success.

The vegetable crop was entirely successful here last season, but I will particularize no further than to say that the Early Rose potato, as far as tried, has proved an entire success, and is rapidly growing in favor.

In conclusion, I will only add that horticulturists seem encouraged, fruit trees and grapevines are being rapidly planted all over the country.

From the present prospect this will be a great fruit country; in fact, fruit is now becoming one of the staple products of this part of the State, and Horticultural pursuits are growing in favor among the people.

TUESDAY EVENING.

The report of the Committee on Vegetables was presented by the chairman, Mr. C. W. Murtfeldt.

What shall we eat, has probably been asked by the first pair, and we believe by all their descendants down to our day. Surely every one present has asked the question. So important has this question been considered by some men, that they have made it a life study. Epicures in all ages have given to it much time and consideration, even before we had French cooks or *sauce piquant*. Yet the question is not settled, and we believe never will be, as long as this green earth revolves around the sun. Every morning in every palace, dwelling or hovel comes up the question, what shall we eat to-day? One would infer that there was some choice in the matter of diet, or else why ask the question?

Your committee are of those who believe that there are *lawful* pleasures of the tables, that some things are more toothsome as well as wholesome than others, and that especially in food "variety is the spice of life."

Why, sir, even in the well regulated households of the so-called lower classes of Europe, especially on the Continent, where potatoes are the great staple, and often the only attainable vegetable, and where they appear on the table at least once a day every day in the week, they are not offered in the same guise twice during that time, even the poor would think that a hardship.

We believe, sir, as with fruits so with vegetables, there is "a season and a time," when each is best, and that out of season, one has little relish for that particular kind. In this latitude there are some vegetables that may be sown or planted in autumn, if it is desirable

to have them early in the season. Among these we may name spinach, lettuce, onions, shallops, cresses, &c.; if they spring up in the fall, a little mulch or covering may be needed, but generally most of these will stand the winter.

During the cold or cool time of the year, men are disposed to favor a strong meat diet; this is apt to provoke, in many persons, an abundant secretion of bile, which in turn is counteracted by partaking freely of early vegetables. Scurvy, a disease to which sailors are exposed when on long voyages and deprived of vegetables, is readily cured by a free use of the same.

As the season advances man craves vegetables that are a little more solid than "greens," lettuce, cresses, and the like. Asparagus, green peas, beans and beets are relished by everybody almost, and we long for the time when we can dig our first new potatoes or pick ripe tomatoes. A well arranged vegetable garden should offer also kohlrabi, May turnips, cauliflowers, beans in variety, cabbage, summer squash, &c. Cabbages and cucumbers are not considered very healthy nor nutritious, yet they are innoxious and harmless, if rightly prepared; the latter are very cooling and refreshing during the warm season.

Sweet corn, tomatoes and sweet potatoes are in demand in early fall, and by a little care and repeated plantings, their season can be very much prolonged.

Your servant, sir, had the honor to dine with that eminent and veteran horticulturist, Chas. Downing, quite late in November last; a very fine dish of sweet corn (eaten from the cob) graced the table, and who does not know that tomatoes, quite equal to the fresh, can be had the year round.

Celery is a healthy and universally esteemed vegetable for fall and winter, and this is not difficult to grow.

Aside from those enumerated, a good garden should furnish egg plant, endive, winter squash, carrot, parsnips, Lima beans, Russian or Swedish turnips, and our cellars should be well stored with most of these for winter use.

Our St. Louis public markets are but indifferently supplied with first-class vegetables, and those offered are often stale, unwholesome and frequently flavorless. Our market gardeners, although hardworking, frugal and industrious, pay too little attention to varieties and quality. This is especially the case with lettuce, beans, peas and potatoes.

Plenty of fertilizers and thorough constant cultivation, are the secrets of success in the growth of all vegetables.

The following list is submitted as comprising a good and tried assortment.

The list was referred to a committee consisting of T. R. Allen, Dr. L. D. Morse and T. W. Guy.

A paper was then read by Professor Forrest Shepherd, "On soils

resulting from the disintegration of particular rocks, and their adaptability to particular crops."

Mr. President, ladies and gentlemen: The field to be cultivated is the world, and in the words of King Solomon "the profit of the earth is for all, and the King himself is served by the field." It has been very properly remarked that, when the business of agriculture is active and flourishing, all the useful arts invariably prosper, and on the other hand, when agriculture is neglected or declines, all those useful arts proportionally decline and perish.

This being true, the art and science of agriculture may with reason be considered the foundation of all arts, and an *inquiry* into the properties and capabilities of different soils, and their relation to the rocks on which they rest, is at once of vital importance to the well being of *society.* The prosecution of such an *inquiry* with reference to the rocks and soils of Missouri, will for the present occupy our attention.

It is now an established chemical fact, that water charged with carbonic gas is constantly decomposing all alkaline rocks, such as limestone, granite, syenite and various states in so much marked a manner, that thereby we are enabled to account for the reduction of the cataract of the Nile (as it existed in the days of Strabo and Seneca), sinking the bed of the stream to a depth of twenty-six feet, and at the present exposing only a rapid of about six feet fall, instead of the former cataract.

In the same way many account for the rural cliffs along our streams, and the vast gorges and canons of the Colorado and other rivers. The wide spread chemical action, together with the attrition of water and the expansive force of frost, is constantly employed in forming the soils that rest upon these rocks; subject, however, to the agency of drifting or transporting currents.

In the State of Missouri, I am happy to say, that we are in the main free from such hitherto transporting agencies. And that consequently over millions of acres the soil may be traced immediately to the decomposition of the adjacent and underlying rocks.

Here I take occasion to remark, that with reference to a large portion of South and Southern Missouri one very important, and I may say *essential element* of fertilization has hitherto been disregarded, or at any rate over looked.

I refer to the phosphate of magnesia in connection with our widely extended magnesian lime stone rock formation. Liebig gives the analysis of a soil in Belgium remarkably fertile which contains eleven per cent. of magnesia, and further states that the seeds of different kinds of corn contain phosphate of magnesia, and that they cannot be formed without it. Here then, in Missouri, over a wide spread area, we have an unlimited supply of lime and magnesia, two of the most important and absolutely essential elements for maturing and perfecting grain crops to the end of time. According to Lyon

Playfair the ashes of wheat contain an equal amount of lime and magnesia. The ashes of barley contain also an equal amount of magnesia, and the ashes of beans nearly the same. It should ever be remembered, says Whitley, that the *inorganic* food of plants is derived wholly from the soil. I here take occasion to mention an *indirect* fertilizer very abundant in Missouri, but so far as I am informed it has never been applied. I refer to the sulphate of baryta in a state of fine powder used on wheat crops as a substitute for gypsum or sulphate of lime. While visiting Rockbridge county, Virginia, some time since, I found the farmers busy in mining and grinding this material and sowing it broad-cast over their wheat crops, at the same time saying it did not act as readily on the wheat as gypsum, but that it lasted longer, and its good effects were manifest years afterward. This material is the heavy spar or tiff of the lead miners, and mining districts of Missouri. The above is the only course of experiments I have known in connection with its application to growing crops. By the disintegration and decomposition of the granite, the augitic, syenites, basaltic, hornblendic and trapeau rocks of South Missouri and especially in Madison and adjacent counties, we find vast stores of additional essential inorganic elements, continually adding fertility to the soils reposing upon or near those rock formations.

The feldspar of the granite gives us from eight to sixteen per cent of potash. The albite of the granite gives eleven per cent. The syenitic hornblende eighteen per cent of magnesia. By comparing the analysis of these different rocks, with the ashes of our most important crops, we discover a remarkable correspondence. It is around the base of the syenitic hills that we usually find a durable soil of great fertility, sufficiently open to allow the water and air to reach the roots, and sufficiently tenacious and porous to retain the moisture requisite for the growing crops. The analysis of some of the basaltic and hornblendic rocks form a striking resemblance to the decomposed lavas at the base of Vesuvius and Ætna, so wonderfully adapted to the culture of the vine.

Among the great variety of rock formations in Missouri we may also expect to find of apatite, or native phosphate of lime, a substitute for bone dust, similar to that found in the granite of Johann, Georgoustadt and Schoberg, in Germany, in the loose granite gravel near Berlin, in the syenite of Messieu, and in the syenite of Freidrichswerm, in South Norway, in the hornblende, at Elfololen, Sweden, at Labau, in Saxony, at Tuhlowitzin, Bohemia, at Meiches, in Vogelsberge, where the crops of wheat in consequence are truly astonishing. It is also found in the traprocks of Wickenstein, Cabode Gata, and other places, among the magnetic iron ores of Sweden, Norway, and New Jersey, and largely among the silicious limestones of Canada East.

Phosphoric acid has also been detected in nearly all mineral waters subjected to careful analysis.

Chlorine exists to some extent in our limestone waters, and silex in minute division by the constant disintegration of the hydrated silicates interstratified with the magnesian limestone is already prepared for the growing crops of many years. Aluminia and magnesia are as extensive as the area to be cultivated, and in short, we have in the State of Missouri a rich supply of the inorganic food for most important crops, inexhaustible for centuries. Should the above enumerated inorganic fertilizers ever become exhausted, and future generations be in want, they may, with advantage, fall back on two very extensive and no less valuable fertilizing resources for their crops. I refer to the saltpetre earth in the innumerable caves distributed through the great limestone region of Missouri, as one resource, and the drifting mud held in suspension and annually transported by the waters of the Missouri river, as another. The saltpetre earth will contribute largely to the health and fertility of the peach trees, as well as other crops, and the river deposit sifted over the meadows and uplands will entail perpetual Eden. The discharge of the Mississippi river into the Gulf of Mexico is estimated to be 38,600,000 pounds of water per second, and Messrs. Humphrey and Abbott (engineers) say that this pushes along in the bottom of the river a body of mud and gravel sufficient to increase the solid matter of the Gulf *one-tenth* in volume. A large portion of this deposit is derived from the Missouri river, and it will continue to be an immense fertilizing resource to the end of time.

In view of all these vast fertilizing resources in the great State of Missouri, we are led to ask in conclusion, What ought our farmers and cultivators to know in order to raise the *greatest crops* at the smallest expense and with the least injury to the land?

1. To effect this all-important object, should they not know the composition of the crops they raise, the part that will burn and also of the composition of the ashes after they are burnt?

2. Should they not know the food their crops require for their growth according to their composition?

3. Is it not highly important that they should understand the nature of the plants they grow, as well as the substances from which they draw their nourishment?

4. Should our growing crops entirely exhaust one or more elementary substances necessary for the perfection of the crop, and the ground consequently become barren, should not our farmers then know what additions to make in order to restore its original fertility?

I can anticipate only one answer, the affirmative to all these questions, and let me ask again, how is this all to be known without the establishment of *State or county* agricultural schools, properly endowed and fitted to diffuse scientific as well as practical instruction among the people?

We apprentice our sons to the blacksmith, carpenter, to the tailor, the shoemaker, the painter, the lawyer and the doctor, to spend

years in order to gain experience for their future occupation; but what provision has hitherto been made in Missouri for the sons of the farmer?—the proprietors of the soil, the bone and sinew of the society, who wield a large portion of the fixed capital, and whose daily toil goes far to sustain the increasing millions of the great West.

What agricultural schools have done in other countries they will undoubtedly effect for Missouri with similar management.

The agricultural school at Hohenheim, four miles from Stuttgard, it is said, has extended its beneficial influence throughout the whole kingdom of Wurtenberg and even into adjoining countries. It has attached to its school-rooms and lodging houses farming and other grounds to the extent of nine hundred and sixty acres.

It has, for the use of the pupils, a museum, a library, a chemical laboratory, apparatus of various kinds, a cider press, a vinegar manufactory, a beet-sugar manufactory, a brewery, a distillery and various other appliances. Its grounds are divided into fifty acres of arable land, two hundred and forty-two of meadow land, thirteen of wood land, sixty-seven acres of nursery, two acres of hop plantation, fourteen acres for a botanical garden, one acre for kitchen and flower garden, thirty-three acres for experimental ground and eighty-five acres of reserved ground.

The institution is divided into two departments; the lower, devoted to the practical training of the pupils for three years, the higher intended for giving scientific instruction for one year or more. The benefits resulting from the systematic operation of this school have been widely diffused through Wurtenberg. The farmers are everywhere found to be an enlightened class, ready to answer any questions relative to practical agriculture.

The celebrated institution of M. de Fellenberg, in the Canton of Berne, Switzerland, has connected with its building two hundred and fifty acres for experimental industrial farming.

The famous agricultural school in Prussia, near Frankfort on the Oder, commenced with one thousand two hundred acres of poor land that commanded an annual rent of only three hundred pounds, and in ten years the same ground yielded an annual rent of £1,800.

In this school the pupils board with the President, and have their dormitories in the buildings, and receive daily instruction in various departments of agricultural science. One professor lectures to them on Mathematic, Chemistry and Geology; another on Veterinary Surgery; a third on Zoology, Botany and Materia Medica; a fourth teaches them how to reduce scientific acquisitions to practical husbandry. Much assistance is afforded by the laboratory for analyzing soils, and the large botanical garden for explaining the nature of plants. Here workshops are also established for fabricating all the tools required on the farm.

Had we time we might refer to the French National Agricultural College at Grignon, for the benefit of plowmen, shepherds and others.

It has connected with it eleven hundred acres of land. Also the model farm of Rovills; to the agricultural schools of Prussia; to the department of agriculture founded by Sir Wm. Pulteny, Edinburgh, but it would be only a waste of time.

The day has now arrived when the great State of Missouri is about to take a stand for the development of her vast internal resources, and from the working of the powerful and active minds we find already enlisted in this great object, we may reasonably conclude that the time is not far distant when her agricultural schools, properly endowed, shall be found in active operation in different sections of the State, if not in every county, when her terraced hillsides shall vie with the far-famed garden at the Cape of Good Hope, and with other renowned gardens of the continent of Europe, whose crowning glories are hills of *Indian corn*, overtopping the brilliant array of fruits and flowers at a lower level. When the stranger and traveller shall be delighted with the beauty of her flocks and herds—with the low bending golden branches, and the heavy-laden empurpled clusters, on her fruit-crowned hills—with her fields and meadows made to rejoice in abundance, and Missouri, as a whole, shall have become the brightest agricultural luminary on the continent.

Happy, thrice happy, they who shall help and aid in thus restoring primeval Eden, for in so doing, they will deal their bread to the hungry, the blessing of him that is ready to perish shall rest upon them, and when the sun shall have sunk beneath the horizon, posterity will long be cheered by the bright track of his setting.

Dr. Morse inquired if the sulphate of baryta was not too expensive to be used as a manure? It is used in the manufacture of lead. I have heard it said by farmers that have used lime, that it has not done much good here. I would like to know how it is? I think that it may be because our lime contains too much magnesia. Shell lime is perhaps better for our soils. It does not follow that because we have much *limestone* there is much lime in the soil in a condition to be available.

Prof. Shepherd: It was in soils where there was limestone rock harder than those here, where the baryta was used.

J. Henwood: Has seen it used in slate formations.

Wm. Day said: In riding in New Jersey a few years ago, I observed the slate was found in the one part, and the limestone in another, and where the slate and limestone came together was the best soil to produce wheat in that region.

Prof. Shepherd: The sulphate of baryta is used in making white paint, and is used to adulterate white lead. People are making a good paint with it.

It takes ten per cent. of white lead, with dense, boiled oil, without any drier. It is made into artificial ivory, and is used in piano cases. There are thousands of pounds of it that are mixed with iron, that may be got for little or nothing. It is in this State in great abun-

dance, and they obtained good crops of wheat from it in Virginia. To be used as a paint it must be very pure, it is scarce in this State, and the impure article costs but little.

President Peabody: It is difficult to get it pure, it has to be ground and washed with great care with chemicals to get it pure. In using for manure it would be a very common article.

J. Henwood: After being thus purified it goes through three sets of burrs and is bolted like flour.

J. J. Squires: What would be the effect of calcining?

Prof. Shepherd: It would render it more caustic?

J. W. Guy: Why has the application of lime not been as successful here as in other places?

Prof. Shepherd: It would be necessary to go into an analysis of the soil to determine that point.

Dr. Morse: The post oak soils west of this do not seem to be benefited by the application of lime.

Mr. Stewart: Tried lime in Knox county with good results; tried it in Livingston county, and it did not do any good.

J. J. Squire: I remember when a boy my father had a heavy clay soil; he dosed it heavily with lime; he said the effect was to render the soil more friable. He had also a piece of sandy soil on which he used gypsum. It attracted moisture and had a tendency to render the soil more solid.

Adjourned.

WEDNESDAY, JANUARY 12TH.

The meeting was called to order by President Peabody.

Prayer was offered by the Rev. Mr. Marshall.

The Secretary read a report of the horticultural exhibition at the skating rink.

A special meeting of the officers and committees of this society met in the office of President Peabody on the 3d of August, at which was presented an invitation from the Mississippi Valley Grape Growers' Association to unite with them in a joint exhibition in St. Louis, during the fall.

After due consideration it was deemed advisable to hold a joint exhibition at the skating rink, on the 7th to the 10th of September.

The exhibition was accordingly held, and succeeded beyond our expectations.

Although falling short, in many repects, of what such an exhibition may be made in the future, as an educational experiment, as a test of the public taste in regard to the refining pursuits of horticulture and floriculture, it stands out prominently, and furnishes abundant evidence of the appreciation of the St. Louis public, and of the value of such exhibitions in furtherance of floriculture and pomology.

We cannot dismiss this part of the subject without tendering our warmest thanks to the professional florists of the city and vicinity for the warm, hearty liberal effort made by them to give grace and beauty to the occasion. We cannot express how much is due to them for their admirable efforts.

LIST OF EXHIBITORS AND VARIETIES.

Jas. E. Starr, Eminence, Illinois.—Ben Davis, Red Canada, Rome Beauty, Snow, Lady Apple, Pennsylvania Red Streak, Large Siberian Crab, American Golden Russet, Rawle's Janet, Yellow Bellflower, Herefordshire Pearmain, Newtown Pippin, Maiden's Blush, Gilpin, Willow Twig, Rambo, Sweet Nonsuch, Hubbardston Nonsuch, Westfield Seek-no-further, Winesap, Unknown, Swaar, Fall Wine, Pryor's Red, Brown Sweeting, Northern Spy, Unknown, Smith's Cider.

D. Hall, Alton, Illinois.—Seckle, Howell, Duchess d'Angouleme, Bartlett, Unknown, Brandywine, and Potatoes.

H. N. Kendall, Upper Alton, Illinois.—Duchess d'Angouleme.

H. J. Hyde, Godfrey, Illinois.—Belle Lucrative, Bartlett, Flemish Beauty, Seckle.

E. R. Mason, Webster Grove, Mo.—Seckle, Belle Lucrative, Winter Nelis, Beurre Diel, Beurre Clairgeau, Louise Bonne, White Doyenne, Howell, Figue d'Alencon, Beurre d'Anjou, Duchess d'Angouleme—pears. Fallawater, Gilpin, Ortley, Newtown Pippin, Soulard, Wine Sap, Rambo, Peck's Pleasant—apples.

A. S. Redfield, Bunker Hill, Illinois.—Sangamon, Red Streak—apple.

G. H. Timmerman, Meramec, Mo.—Seventeen varieties apples, unnamed.

Geo. H. Hill, Kirkwood, Mo.—Bartlett, extra fine, Louise Bonne, Seckel, two unknown, Swan's Orange, Vicar of Winkfield, Duchess d'Angouleme, Henry IV. Orange, Quince and Persimmon.

W. T. Essex, Kirkwood, Mo.—Beurre Diel, Howell, White Doyenne, Bartlett, unknown, Belle Lucrative, Flemish Beauty, Louise Bonne, Beurre d'Anjou, Duchess d'Angouleme, Swan's Orange.

Hudson E. Bridge, Glendale, Mo.—Louise Bonne, Beurre Clairgeau, Stephen's Genesee, Winter Nelis, Vicar of Winkfield, Howell, Duchess d'Angouleme, Beurre Superfin, Urbaniste, Beurre Salat.

Dr. Edwards, Kirkwood, Mo.—Beurre Diel.

E. A. Riehl, Alton, Illinois.—Howell, White Doyenne, Louise Bonne, Bartlett—pears. Old Mixon Cling—peach.

T. L. Lyon, Bethalto, Illinois.—Fall Wine, Porter, Janet, Fall Russet, Fallawater. Five varieties of pears. Early Rose Potatoes.

James Barclay, Victoria, Mo.—Peaches—Andy Johnson, Barclay, three good seedlings not named.

Dr. Buck, Glenwood, Mo.—Dried Sweet Corn. Nansemond, Common Red—sweet potatoes.

John Nichols, Sulphur Springs, Mo.—Cayuga Redstreak—apple.

John Henwood, St. Louis, Mo.—Seedling peach, not named, Lagrange; Cherry currant; two seedling gooseberries; one English gooseberry.

Thos. Moss, Sulphur Springs, Mo.—Plums, large, red, fine flavor.

Wm. Watts, St. Louis, Mo.—Large black plum, unknown.

Jas. J. Kelley, Webster, Mo.—Romanite, Autumn Pearmain, Pryor's Red, Lady Apple, Janet, Fall Queen, Winesap, Maiden's Blush, Dominie, Rome Beauty, Yellow Bellflower, Smith's Cider—apples. Louise Bonne de Jersey, Summer Colmar, Buffum, Beurre Langalier, Beurre gris de Hiver, Noreau, White Doyenne, Bartlett, Flemish Beauty, Duchess d'Angouleme, Beurre Diel, Jackson's Elizabeth, Echasserie, Fondante de Malines, Graslin, Des Nonnes, Andrews—pears.

Stark, Barnett & Co., Louisiana, Mo.—Glout Morceau, Bartlett, Urbaniste, White Doyenne, Louise Bonne de Jersey, Beurre d'Anjou, Oswego Beurre, Buffum, Duchess d'Angouleme—pears. Northern Spy, Maiden's Blush, Porter, Rome Beauty, Willow Twig, Cayuga Red Streak, Esopus Spitzenberg, Tulpahocken, Rambo, Newark Pippin, Horse, Roxbury Russet, Ortley, Fulton, King of Tompkins County, Buckingham—apples.

N. B. Harlow, Kimmswick, Mo.—Bartlett, Duchess d'Angouleme, Beurre Diel, White Doyenne—fine specimens.

W. J. A. Smith, Ferguson, Mo.—Duchess d'Angouleme, Bartlett—pears; fine specimens.

N. J. Colman, St. Louis, Mo.—Flemish Beauty, Duchess d'Angouleme, Bartlett, Louise Bonne de Jersey—pears. One plate Fall Pippin apples.

M. G. Kern, St. Louis, Mo.—Seckle, White Doyenne, Winter Nelis, Duchess d'Angouleme, Swan's Orange, Bartlett, Louise Bonne de Jersey, Beurre Goubault, Stephens' Genesee—pears. Smith's Cider, Tulpahocken, Rome Beauty—apples. Late Admirable, Smock's Free—peaches.

Henry Michel & Bro., St. Louis.—Japan Quinces; Bermuda, Brazillian, Yellow and Red Nansemond,—Sweet Potatoes; Early Rose, Calico, Climax, Cherry Pink-Eye, Cusco,—Common Potatoes, fine specimens.

Isidor Bush & Son, Bushberg.—Pears, White Doyenne, Beurre d'Anjou, Beurre Langalier, Canandaigua, Dearborn's, Kirtland, Ananas d'Ete, Duchess de Beurre d'Ete, Brandywine, Henry IV, Figue d'Alencon, Beurre Gonbalt, Ronselet Stuttgart, Winter Nelis, Fon-

dante de Noel, Stephens' Genesee, Beurre Diel, Pardise d'Autumne, Nouveau Poiteau, Epine Dumas, Beurre Bosc, Beurre gris de Hiver, Sheldon, Buffum, Moyamensing, Jaminette, Kingsessing, Seckel, Belle Williams, Passe Colmar, Louise Bonne d'Jersey, Tyson, Lawrence, Onondaga, Beurre Hardi, Howell, Beurre Easter, Napoleon, Beurre Clairgeau, Flemish Beauty, Bartlett, Doyenne Panache, Belle Lucrative, Duchess d'Angouleme; Apples—Ortley, Michael H. Pippin, Tulpahocken, Unknown, Jonathan, Fall Queen, Fall Pippin, R. I. Greening, Rambo, Yellow Bellflower, Pryor's Red, Esopus Spitzenberg, Talman's Sweet, Rawle's Janet, Winesap, Ben Davis.

H. Claggett, St. Louis.—Pears, White Doyenne, Seckel, Bartlett, Howell, Louise Bonne de Jersey, Duchess d'Angouleme; Apples—Rambo, Unknown.

B. Smith, Cuba, Mo.—Apples—Yellow Bellflower, Jonathan, Rome Beauty, Ortley, Rhode Island Greening, American Golden Russett, Fall Pippin, Winesap, Porter, Northern Spy, Rawle's Janet, Newtown Pippin.

B. F. Lazear, Louisiana, Mo.—Apples—Rambo, Milam, Rome Beauty, two unknown.

Park of Fruits, St. Louis county, C. H. Haven, Superintendent.—Pears—Beurre Superfin, Bartlett, Beurre Diel, Swan's Orange, Glout Morceau, Louise Bonne de Jersey, Duchess d'Angouleme, Seckel, Des Nonnes; Apples—Alexander, Northern Spy, Lady Apple, Roxbury Russet, five varieties not labeled.

Wm. Harris, Allenton.—Apples—Sweet Russet, Pryor's Red, Tulpahocken, Baldwin, Ortley, Pennsylvania Red Streak, Winesap, Fall Pippin, Yellow Bellflower, Northern Spy, Janet, Rambo, Gilpin, Black Gilliflower, Talman's Sweet, Maiden's Blush, two unknown.

Mrs. L. H. Baker, St. Louis.—Apples—Colvert, Gloria Mundi.

Jas. Graham, Glencoe.—Apples—Fall Pippin, Ortley, Flushing Spitzenberg.

Wm. Muir, Fox Creek—Pears—Stephen's Genesee, Vicar of Winkfield, Beurre Diel, Buffum, Golden Beurre of Bilboa, Duchess d'Angouleme, Dix, White Doyenne, Grey Doyenne, Bartlett, Spanish Bon Cretin, French Bon Cretin. Apples—St. Lawrence, Missouri Pippin, Roxbury Russet, Easter Pippin, Winesap, Colvert, Northern Spy, Ortley, Yellow Bellflower, Oblong Crab, Red Winter Pearmain, Priestly, Smith's Summer, Herman, Oconee Greening, Clyde Beauty, Flushing Spitzenberg, Julian, Maiden's Blush, Green Newtown Pippin, Hewes V. Crab, Talman's Sweet, Lemon Pippin, Empress of Russia, Gothouse, Gloria Mundi, Pryor's Red, Snow, Lippincott's Sweet, Camac's Sweet, Disharoon, Baldwin, Strawn's Harrison, Ewing, Carthouse, White Winter Pearmain, Michael H. Pippin, Yellow Newton Pippin, Ladies' Sweet, Hugh's.

The following is nearly a full list of the varieties of grapes exhibited, with the names of the exhibitors:

James E. Starr, Eminence, Ill.—Concord, Delaware, Hartford,

Norton, Clinton, Taylor's Bullitt, Diana, Isabella, Rogers' No. 2, Rogers' No. 4, Iona, Creveling.

J. J. Kelly, Webster Groves.—N. Muscadine, Perkins, Concord, Rulander, Delaware, Catawba, Taylor's Bullitt, Diana, North Carolina Seedling, Union Village and Norton.

Stark, Barnet & Co., Louisiana—Ives and Norton.

Lemuel Harrington, Kimmswick, Mo.—Concord, very large bunches.

Hayden & Shelby, Alton, Illinois—Concord, display very fine.

John Vallee, Miller's Landing, Mo.—Concord, Clinton, Norton, Minor's Seedling, and Seedling from Concord, peculiar, good aroma.

J. D. Davis, Clarksville, Mo.—Delaware, Norton and Concord.

N. J. Colman, St. Louis—Norton, Hartford, Minor's Seedling, Clinton, Concord, Vine of Norton, Delaware and Dracut Amber.

M. G. Kern, St. Louis.—Vine, and display of Concords.

H. Michel & Bro., St. Louis—Rulander, Creveling, North Carolina Seedling, Dracut Amber, Perkins, Taylor's Bullitt, Agawam, Clinton, Norton, Cape, Anna, Merrimack, Martha.

Isidor Bush & Son, Bushberg, Mo.—Concord, Herbemont, Norton's, Minor's Seedling, Taylor's Bullitt, Catawba, Rulander, Dracut Amber, Mary Ann, Delaware, Martha, Cunningham.

H. Claggett & Son, Gray's Summit, Mo.—Concord, Norton, Clinton and Delaware.

D. T. Jewett, St. Louis, (grown in open air)—Black Prince, Golden Chasselas, European Rulander, Iona and Black Hamburg.

J. P. Edwards, Bailey's Station, Mo.—Rulander, Herbemont, Norton, Catawba, Concord, one unknown, and fine display of branches.

B. F. Lazear, Louisiana.—Concord, Union Village, Delaware, Catawba, Taylor's Bullitt, Isabella, and three varieties not named.

Park of Fruits—Norton, Taylor's Bullitt, Catawba, Herbemont, Delaware.

J. M. Jordan, St. Louis—Large vines and display of Concords—very fine.

Daniel Hall, Alton, Ill.—Delaware, Clinton, Rogers' No. 4, Creveling, Hartford, Taylor's Bullitt, Isabella, Norton, Diana, Iona, Rogers' No. 2.

E. R. Mason, Webster Groves, Mo.—Vines of Concord, Delaware, Dracut Amber, and baskets of varieties mixed, Franklin, Taylor's Bullitt, Norton, Oporto, Concord, Alvey, Clinton, Rogers' No. 8, Blood's Black, Rogers' No. 4, Elsinburg.

H. N. Kendall, Alton, Ill.—Chasselas Rose des Indes, Black Hamburg, one unknown—foreign.

George H. Gill, Kirkwood, Mo.—Rebecca, Delaware, Diana, Norton, Catawba, Iona, Herbemont, Ontario, Northern Muscadine, Isabella, Israella, Maxatawney, Concord, Taylor's Bullitt, Clinton, Rogers No. 1, unknown, Kirkwood Malaga.

Hudson E. Bridge, Glendale, Mo.—Black Prince, Black Hamburg

and Golden Hamburg, grown under glass; Black Hamburg, vine in pot, three bunches.

Dr. B. F. Edwards, Kirkwood, Mo.—Rogers' No. 33, Rogers' No. 12, Rogers' No. 4, Delaware, Rogers' No. 22, Island, Lacon, Concord.

S. V. Papin, Webster Groves, Mo.—Concord, Norton.

E. A. Riehl, Alton, Ill.—Rogers' No. 1, Rentz, Ives, Delaware, Creveling, Rogers' No. 5, Maxatawney, Rogers' No. 9, Rogers' No. 2, Diana, Rogers' No. 19, Cynthiana, Rogers' No. 13, Rogers' No. 4, Rogers' No. 15, Rogers' No. 33, Iona, Norton, Rogers' No. 3, Clinton.

Cliff Cave Wine Company—Rogers' No. 4, Rentz, Concord, Rogers' No. 1, Norton, Delaware.

Charles Peabody, Glenwood, Mo.—Concord, vines of fruit, displaying Delaware, Creveling, Israella.

J. H. Tice, Cheltenham, Mo.—Iona, Clinton, Taylor's Bullitt, Naumkeag, Traminer, said to be parent of the Delaware; German grape, unknown; wild grape (Sage), from Pennsylvania; Garrigues, Venango.

The Floral Department was made an entire success through the indefatigable exertions of a few individuals.

A contemporary says in describing the appearance of the Rink, lying at the feet of the observer, we observed two large beds of rare flowers by H. Michel & Bro.

Four smaller but fine beds by E. R. Miltenberger, Chas. Beyer, Louis Rindfliesh and H. Michel & Bro.

Two large commanding masses by M. G. Kern, of the St. Louis Winter Garden.

In the centre a fountain, with a fine display of flowers by Kœnig and Gass.

Two fine beds by Chas. Connon, of Webster Grove.

Two beds by Chas. Beyer and Wm. Schray.

Three beds, two by Wm. Syred and one by Chas. Connon.

At the end was the very fine collection from Henry Shaw, and a minature forest scene by Colman and Sanders.

On the tables Chas. Connon presented 20 varieties of Roses: 14 Coleus, 6 Geraniums, 6 Lantanas, 4 Neraim Oleander, 4 Calladium, 3 Heliotrope, 5 Bignonia, 2 Varigated Hibiscus, 2 Vinca, 2 Centaurea, 2 Acuba Japonica; berries a great variety, Ficus, Trades, Cantica, Cryptomeria.

G. Beyer had 20 Bigonias, 6 Phlox, 6 Celosia, 20 Cacti, 5 Tucca, 5 Colens, 4 Camias, 3 Ficus, 3 Achyranthes, and many other plants.

Dr. E. S. Hull, of Alton, was called on to give some information on the "incentives and drawbacks of fruit culture."

Dr. Hull said he had no article prepared on the subject but would state a few points. I am afraid there are more drawbacks than incentives. If I had all my means at my command, and was seeking to begin anew in business, I would not choose fruit-growing for profit.

Not that there need be any want of success in itself, but because I would be almost entirely controlled by the action of my neighbors in regard to fruit growing, and all hope of success depends on combined and energetic efforts towards the controlling of insects.

Two years ago, when at Cobden, I said that it would be fifteen thousand years before they would get a full crop of peaches, it was thought an extravagant statement. A year ago I was in the same locality, and I am prepared to reiterate the statement, for I could not find a sound peach in all that region.

I went to Chicago to see how they sold, the general run of the fruit set the price of all. I got Cubbell & Co. to select some boxes of perfect fruit, they were opened out and sold on their merits and brought $3 50, while the run of them brought one dollar. By selling the fruit as a lot, the bad fruit keeps down the price of the good.

The curculio is certainly one of the drawbacks to fruit culture, but can be controlled. If you want fine, sound fruit, especially peaches, you must be willing to spend time and labor. If my neighbor is careless, I have not only to destroy my own, but am always receiving colonies from him, because at a temperature of 65 degrees they will fly like house flies.

When the temperature attains this hight, they will come in from the forest and are ready to lay eight or ten eggs a day.

Men have tried the curculio catcher and not found one, and yet their crop of fruit was destroyed, and they get discouraged; but it should be understood that they fly in from other parts. They fly against the wind, it would seem that the wind carries the scent, that they follow for food to their young as well as a place in which to deposit their eggs.

When I try early in the season I can get 99 out of every 100.

There are 22 days during which the curculio lays her eggs at the rate of eight to ten a day.

It is as much a man's duty to take care of his insects as of his stock. Some years ago I caught 60 curculios and whitewashed them and took them to a neighbor's three quarter of mile distant, and caught nearly all back.

Another difficulty is this *scab* on the apple. It is a fungus that at first begins at a very small point. Last winter I called attention through the "Entomologist," to a little louse, the eggs of which are found on the trees. They are the eggs of the *Aphis Mali*. The insects were seen last season in large numbers.

Knowing the injurious effects of *Bark-lice* on the trees, I wanted to know what injuries resulted from these. I marked some apples while yet quite small, just formed from the bloom, watched the points they made; these became the foothold of a fungus, and with a pin-point I inoculate other fruit with it, and it produced the same results. This scab is seldom found on *russet* varieties or the Keswick Codlin.

Where it takes hold of an apple it becomes not only black and unsightly, but cracks and becomes worthless.

A remedy—Apply lime slacked with warm water, and with a syringe throw this into the tree and it will kill these lice. This will kill soft-skinned insects. It will not kill beetles; would dust the tree before the bloom; half a pint to a tree. Dust from a perforated tin box, on a long pole, just before and just after they bloom; would not try while in bloom. The insects are always at the extremity of the bud. It is calculated the curculio is traveling at the rate of about sixty miles a year. It will reach California in two or three years; will be sent in fruit and old fruit packages. I think, from my own experience, they will fly five or six miles. It is difficult to make a good curculio catcher, to have it properly balanced. Mr. G. E. Porter, Ottawa, Illinois, proposes to make them under my direction. They can be obtained by a few small growers uniting to get one machine, and so on.

Another drawback is seen in this little point on the apple (showing an apple). It is caused by another curculio. I received a specimen from Dr. Walsh two years ago. I had noticed the little fellow before; he has four humps on his back. He makes a small hole just through the skin, lays the eggs, which hatch, eat out a hole large enough to let out their body, and drop. In some parts of Michigan the average has been forty holes in a fruit. At Villa Ridge the average is about twenty. He has left the fruit and gone into the ground; the fruit rots upon the tree; it is more difficult to grow the apple perfectly than the plum; it is not easy to shake or jar him down like the common curculio; likes the crab apple best; if yon snap or jar a limb three or four times, he will just look up. Mr. Jackson had two crab trees in a corner of his orchard near the woods; on these he got about a quart, and none afterwards. Entomologists say they hybernate in the ground, but I rather think they hybernate in the woods. They will thus be much reduced by cleaning up the brush and leaves and burning them.

When we have done with the insects we have yet something to do. There is the blight. Some eighteen or twenty years ago I root-pruned a Dix pear tree, to throw it into bearing, and this tree had no blight. My unpruned trees blighted. Observing for some years that those root-pruned did not blight, I have continued it from that time to this. A tree root-pruned once in two years does not blight. Trees will make twenty to twenty-five buds on a limb that is more than they can mature—more than can be exposed to the light, sun and air. The vitality becomes impaired, and fungi take root and the tree becomes exhausted.

A slow growth has a tendency to produce firm, well-matured wood. If we can induce this character we can grow the fruit almost anywhere North. This is why the Duchess of Oldenburgh can be grown where no other apple can. (He illustrated the growth by the

cell in the *wood* and a drawing.) So by adopting root-pruning the tree is rendered hardier.

Dr. Spalding: Would it not be well to plant plum trees round or among other trees, from which to gather the curculio crop?

Dr. Hull: I think so.

H. M. Vories: What is the time and mode of root-pruning?

Dr. Hull: It is described fully in the transactions of the Illinois Horticultural Society; also in the *Prairie Farmer*. There is a plow being made by Mr. Potter, of Ottawa, Illinois, for this purpose. It will cost four or five dollars. Why the Seckle is generally exempt from blight is that the cells are early matured. The roots of the fungus have not time to penetrate through the bark into the wood cells and root-pruning operates on the same principle.

The President called attention to the fact that many ladies were present, and invited them to participate in the discussion, and propose any questions that might arise in their minds.

The report of the Committee on Orchards was called up.

Mr. Hyde, of Alton, was requested to give his experience in root-pruning. Had experimented with root-pruning against the blight for four years. The first time I tried it, from not doing it thoroughly, Dr. Hull told me I would have more blight next year than before. It was so. Next season it was done in the summer, and the blight stopped. I have done it once since. I do it with the spade, but would like to have a cheaper way to do it. It would be dangerous in the hands of *every one*. It costs about five cents a tree. I have trees two inches through, and leave a ball of roots six inches from the stem of the tree. They have as good a growth as any other trees. I think six inches is enough of roots to leave on trees planted seven years. Put back the same soil into the hole; would leave the roots a little longer the next time. I take out a spadeful of soil, and cut down with a spade five inches wide, made for the purpose, and cut the roots below.

Dr. Spalding: Had tried root-pruning several years. First trial was on the Buffum. Trees had made six feet of growth by the 28th day of May. Commenced root-pruning in August, but it was then too hot; have since done it in the fall, winter and spring. To give an idea of results: The blight had commenced on the Buffum; the roots were pruned, and the blight has not spread. Would not root prune at all till the trees are of size to bear. In some cases would root prune to throw into bearing. The smallest trees I have root pruned were two inches in diameter. These I prune from twelve or fourteen inches in diameter to a ball of roots; if the trees are three inches, leave eighteen inches. For every inch of diameter of the stem, I would give a foot of *radius* in describing the circle round the root ball to be left. If the roots are badly balanced this must be

changed. The effect is not only to throw the tree into bearing, but to produce finer fruit. In some cases have cut off the tap root.

I noticed of a gentleman in the South who had a fine pear orchard. When his trees ceased to bear, when he "caught them napping," he took them up and planted them again. He had by accident discovered and practiced root-pruning without knowing it.

Samuel Miller, Bluffton: I have grown pears fifteen years in Pennsylvania without any trouble, but here I have the blight.

Has any one tried grafting on the "white thorn?"

Mr. Wood has tried it and succeeded.

Mr. Muir has tried it where the roots stood in the ground, and succeeds.

H. M. Vories, St. Joseph, Mo.: I would have large quantities of pears but for the blight. When I settled in St. Joseph twenty six years ago, I got some trees from Mr. Sigerson; planted them in the hazel brush; many of those trees are standing to-day. I cultivated them many years, but they have been long in blue grass. I have planted 600 and my partner 1000, but they have blighted badly. Some have been replaced twice. I have noticed the Seckle does not blight, and there is no Duchess entirely dead. In Oregon, Holt county, they say there is no blight.

F. W. Braches, Franklin county: I wish to ask if the blight is caused by insects or by the air. When I commenced twenty-five or thirty years ago, there was no rot or blight. As insects increased the blight and rot came, and are now so bad we cannot have any good fruit. I think insects are the cause of the trouble.

J. J. Kelley, Webster Groves: I have heard it remarked that the Seckle is not subject to blight. I have had it planted seven or eight years, and some of the trees have blighted. There are some of the rows that blighted three or four years ago, and are gone. I am glad to hear such good accounts of root pruning, but fear it may reduce the life of the tree.

The President announced the following committees:

Fruits on the Table—Geo. Husmann, Bluffton; W. B. Lipsey, Ind. W. F. Bowen, Vineland; H. T. Mudd, St. Louis; Rev. John Montieth, St. Louis.

Wines—J. M. Pearson, Alton; Dr. A. Furnas, Ind.; Dr. L. D. Morse, St. Louis; Samuel Miller, Bluffton.

Flowers and Plants on the Table—Mrs. F. Minor, St. Louis; John Henwood; Carew Sanders.

Horticultural Implements—Dr. H. Claggett, St. Louis; H. J. Hyde, Alton; H. N. Studley, Webster Grove.

Cider—N. J. Colman; W. S. Jewett; J. W. Guy.

H. T. Mudd referred to the desire of the President to obtain the cooperation of the ladies. He understood that one of those present

desired to thank the President and Society for this attention, Mrs. Minor.

The President invited Mrs. Minor to take the stand.

Mrs. Minor thanked the President for this kind invitation. Most of the ladies thought this meeting was got up merely to increase the membership. But while I tender thanks for this kindness, I notice, gentlemen, that most of you, while you come here yourselves, have left your "baggage" at home—not one has brought a *wife* with him. Women feel that when they have a duty to perform they will do it. I have read the reports of this Society, and think the subjects it embraces eminently adapted to women, when we reflect that women have often a great part to perform in this, that they have mouths to fill.

The true idea of a happy country is when every man and woman shall have a home for themselves. Rome was best ruled by a man fresh from the plow. Many house-wives in the country think their lives hard, but if they saw the interior of much of the life of the city, they would bless their lot. She referred to the fact that in most public meetings, inaugurations, etc., women were left out. Here there is a new era opened up to women.

Col. Colman thought that it was mainly the fault of the ladies themselves that they had no part in the meetings. They had always been invited.

Mr. Mudd, Dr. Spalding and the President thought that it arose from not having had a proper place to meet in before. Now that cause is removed; they can come with comfort.

The President in announcing the election of officers as the special order for the afternoon, said that he was in favor of rotation of office, and positively declined serving again.

H. T. Mudd, in noticing this fact, thought it desirable and moved the adoption of the following:

Resolved, That Article 3, of the Constitution of this Society be so amended as to read "the President shall not be eligible for the next succeeding term."

The motion, receiving a constitutional majority, was declared adopted.

Adjourned.

WEDNESDAY AFTERNOON.

The session was begun by the appointment of T. W. Guy and Chas. Connon as tellers, when the following officers were elected for 1870:

President—Dr. H, Claggett, of St. Louis.

Vice Presidents—First Congressional District—N. J. Colman, of St. Louis.

Second Congressional District—T. W. Guy, Sulphur Springs.

Third Congressional District—Geo. B. Clark, Potosi.

Fourth Congressional District—D. S. Holman, Springfield.

Fifth Congressional District—F. A. Nitchy, Jefferson City.

Sixth Congressional District—Geo. S. Park, Parkville.

Seventh Congressional District—H. M. Voriés, St. Joseph.

Eighth Congressional District—O. H. P. Lear, Hannibal.

Ninth Congressional District—Wm. Starke, Louisiana.

Recording and Corresponding Secretary—Wm. Muir, Fox Creek Post office, St. Louis county.

Treasurer—John H. Tice, St. Louis.

John M. Jordan, of St. Louis, then read an essay on

THE PROPAGATION AND CULTURE OF FLOWERS.

Mr. President and Members of the Missouri State Horticultural Society:

It has been generally conceded that each member of this Society should endeavor to perform the duties assigned him, and, as I have been assigned to the task of conveying my ideas of the propagation and culture of flowers, I shall endeavor to do so very briefly.

To condense into a short address the necessary knowledge of Floriculture, to teach the unitiated how to propagate all kinds of plants, would be a laborious task. I shall, therefore, present a few suggestions on the propagation and management of plants, directing more attention to the cultivation of the *taste* for flowers, at the same time giving a few lists of plants for garden and house culture, hoping the other members will furnish the Society with their valuable experience in Floriculture.

The propagation of most soft-wooded plants like Geraniums, Verbenas, Fuchias, Heliotropes, etc., is easily accomplished, by placing the green cuttings in clean river sand heated to a temperature of about 65 degrees Fahrenheit, with the atmosphere about the cuttings at about 55 degrees.

The propagation of the hard-wooded plants, aside from layering in the open ground, had better be trusted to a careful propagator under glass, where he can control the heat, moisture and light, and I would much prefer to take this Society through our propagation houses, and demonstrate to them there, many maneuvers in getting roots and leaves to grow from the cuttings of hard-wooded and resinous plants.

The preservation of pot-plants in the room through summer or winter deserves our attention. Most plants that die in rooms, are killed by too frequent watering. Plants should not be watered unless they show signs of being dry, which is first seen by the soil in the pot turning to a light color.

Then the plant should be watered enough to have the water percolate entirely through the pot. Expose the plants to the air and light at the same time, do not expose them to the gas or strong gaslight, keep the soil on the surface stirred to admit the air.

The following list of plants I would recommend for house culture: Roses, Cornelias, Azaleas, Primroses, Callas, Violets, Mignonette, Geraniums, Heliotropes, Salvias, Begnonias, Bouvoidia, Calceolarias, Cineranias, Carnations, Fuchias, Chrysanthemums, Euphorbias, Fabiana, Archyranthus, Lopezia, Oleanders, Pelargoniums, Pomgranates, Scutelaria, Stenias, Tropoelums, Duetzias, Almond, Daisies, and a general assortment of Liliums and Bulbs. And for a garden where two hundred plants could be grown, I would recommend the following list, which could be varied to suit larger or smaller gardens: 12 Roses, 10 Geraniums, 6 Heliotropes, 4 Petunias, 6 Tabroses, 50 Verbenas, 12 Dahlias, 4 Salvias, 6 Lantanas, 2 Lemon Verbenas, 4 Coleus, 2 Dielytra, 2 Achyranthus, 4 Cannas, 12 Pansies, 2 Vinca, 6 Chrysanthemums, 6 Phlox, 4 Peonias, 4 Delphiniums, 6 Sweet Williams, 2 Plumbagos, 6 Liliums, 1 Geranium, 6 Cupheas, 1 Erythrina, 10 Gladioli, 2 Nuerembergia, 1 Fritonia, 5 Irises.

The following list I would recommend for running plants: Cobea scandens, Passiflora, Mauraudia, Maderia, Morning Glory, and Tropæolums.

From this list, with the familiar hardy shrubs and vines, any one can have perpetual bloom, as well as beautifully decorated gardens and rooms.

Flowers are almost indispensable in every condition of life. We cannot estimate their worth in dollars and cents. Who can calculate the value of one lesson learned by the children as they gather around a beautiful rose bush on a bright January morning, to see for the first time in the winter the opening buds, and hear the expressions of thankfulness, mingled with sad reflections, that all things are passing away? These bright flowers are pictures in the book of nature that we never tire of beholding.

We admire, and justly too, the magnificent lawn attached to the stately mansion of some millionaire, situated in the suburbs of our large cities, dotted over with grass and rare flowers, mingling in one glow of colors, plants from every clime. And as we stand spellbound praising the adorner, our thoughts rise to the Giver of all Good, and we leave the sight refreshed, reproducing the gorgeous scenes many times, years after in our minds.

Now let us take another view, although not on so large a scale, yet when weighed in the balance it is not found wanting. Behold the dwelling of that poor widow, whose scanty means compel her to live in retirement, almost to seclusion, with a few flowers as her companions. These are in perfect harmony with her feelings. Still they may be such as would be called very common, like the sunflower and the hollyhock, with snowball and lilac, the balsam and wild violets

these few flowers to assist her in teaching her children the way they should live, as well as cheer her lonely walk through life; furnishing flowers to decorate the scanty board and the lonely graves of loved ones long since departed; they complete the widow's garden; and I *do* believe that this lonely garden will paint on the retina of Heaven a brighter picture, and will be pointed to in contradiction to the wide spread lawns, bedecked with rocks and rills, garlanded with never-fading flowers.

The extent of the cultivation of flowers is an index to mark the degree of civilization and refinement of any people or country. The rude, untutored minds seldom rise above things that gratify appetite, and can see more beauty in a cabbage or potato than in a camelia or primrose.

In the most refined parts of our country, flowers are an indispensable article on all occasions—they play a very important part. Go into the counting-room of the merchant or banker, and you will see a bunch of flowers decorating the desk, reminding him of home. Visit the school room and see the flowers adorning the desks of teachers and scholars. At church, where we are taught the way of life, as well as at the solemn court of justice, flowers stand as guardian angels, to teach their lesson of mercy. Or go to the banquet, where friends meet to make glad their fellow friends, and while the festive board will be spread with choice fruits and other products, you will always see flowers standing out in bold relief, in the form of bouquets, wreaths and garlands. Now go to a wedding, where every ornament that can add pleasure is furnished, and friends wish to compress into a few brief hours the greatest amount of pleasure, and there see the display in the arrangement of flowers; diamonds may glitter, and pearls mingle their mellow light with other jewels that decorate the loved ones, but it is reserved for flowers to outshine all other adornments, to exert their hallowed influence and teach a lesson of purity, love and friendship, never to be forgotten.

So it is when we wish to show our love for departed friends. We weave a wreath of flowers, as a token of our never-ending love. So let us still cherish the planting of flowers, for we know that they will repay us a thousand times in this world, and much more in the world to come.

Mr. Carew Sanders, St. Louis, reported

A LIST OF HARDY ORNAMENTAL SHRUBS AND PLANTS.

Were I to make out a list of all of the above that I would recommend, or plant myself, under certain circumstances, I would name all that I know and a good many that I don't know—indeed I would exhaust the catalogue. If I had grounds large enough, and means enough, I would have specimens of every kind, because I consider there are none that are destitute of beauty or interest in some degree or another. All possess some measure, either of beauty, oddity or

historical association, and none but what are interesting even in their simple homeliness.

But I presume what this Society wants to consider, and what I am expected to point out, is a list of those most desirable for us to recommend to others, or such as we would plant ourselves under certain limited conditions; and the qualities to be embraced in those we would most recommend should be:

1st. Hardiness and durability.

2d. Beauty, either in form, flower or foliage, or all combined.

3d. Accessibility, that is, can these we recommend be obtained.

4th. Adaptability, that is, will they grow and flourish and succeed in the soil and climate we offer them; will they transplant easily, grow rapidly, and be in all respects desirable.

Unfortunately, we can name no list that will be equally desirable in every respect, as some of the very handsomest are either hard to transplant, slow growers, or have some other defect. But none of these should deter the embellisher of rural scenery from using these most beautiful objects, and liberally too, but they must conform to their habits and natures.

Trees that are hard to transplant, they must take of small size. Trees of slow growth they must stimulate and encourage, and wait for them, but by no means reject them. I would give my consent to no list, from which were thrown out some of our most beautiful trees and shrubs, merely because they were a little hard to transplant; at the same time, under certain circumstances, I might select only those that were easy to live.

The Society may vary this list; others, doubtless, would put in trees, etc., that are here omitted, but I would rather add, to than diminish. I could easier add to the following list than take away any therein named.

Still, if necessity compelled, six, twelve or twenty could be selected that I prefer above all others. If I could have my choice I would take them all, and, like Oliver Twist, "want more."

For six native trees of the largest dimensions, noblest and stateliest forms, I would name:

Sugar Maple—A rather slow grower, easy to live from nursery.

Tulip Tree—Should be frequently removed in nursery, or set out when small.

White Oak—Not found in nurseries.

White Elm—Easily transplanted; rapid growth.

White Ash—Same remarks.

Deciduous Cypress—Should be transplanted when small.

Six Native Trees, scarcely inferior to the above in size, and of rapid growth and easy removal.

Scarlet Maple—Too well known to need any comments.

Silver Maple—Same.

Buttonwood—Same.

Box Elder—Same.

Hackberry—No experience with it.

Blue Ash—Same.

Six Native Trees unsurpassed in beauty, but either hard to transplant, or do not seem to flourish here, being indigenous to a different character of soil, thermal belt, &c.

Sweet Gum succeeds well, but very hard to transplant.

Kentucky Coffee Tree.—Succeeds well; somewhat hard to transplant.

Sweet Chestnut.—Not successful here.

Beech—A noble tree, but of uncertain success here.

Hickory—Succeeds well; not found in nurseries; hard to transplant; can be raised from seed where wanted.

Pecan—Same.

Black Walnut—Same.

Six Native Trees of smaller dimensions, but all worthy of attention.

Red Bud—Exceedingly handsome in early spring.

Dogwood—Flowers white; a splendid contrast to the above.

Buckeye—A very handsome little tree.

Persimmon—By no means destitute of beauty; easily raised from seed.

Sassafras—Distinct and ornamental, especially in the fall.

Osage Orange—Its large, glossy, heart-shaped leaves make it an ornamental object.

Four Native Trees rich and rare in character, indigenous from 35° southward; the connecting link between the vegetation of the tropics and the temperate regions; the large foliage partaking more of the tropical character, and therefore all the more striking here among our smaller-leaved trees.

Magnolia Acuminata—Cucumber tree.

Magnolia Macrophylla—Large leaved Magnolia.

Magnolia Tripetela—Umbrella tree.

Virgilia Lutea—Yellow wood, to which the above remarks do not apply.

Six Common Trees that from their rapid growth, ease in raising and transplanting, their adaptability to some situations, and their usefulness under some circumstances, I consider any list incomplete without them.

Lombardy Poplar.

Silver-Leaved Poplar.

Balsam Poplar.

Tremulous Poplar, or Aspen.

Weeping Willow.

Golden Willow, and some other very ornamental willows.

The Oaks, although so common all about us, contain a number of such handsome trees, that I do not like to omit mentioning a few of

the best as ornamental trees, say six beside the White Oak already mentioned.

Scarlet Oak.

Chestnut Oak.

Burr Oak.

Willow Oak.

Red Oak.

Spanish Red Oak—If these are attempted they had better all be raised from the acorn by the planter himself, either where they are to stand, or be transplanted at one and not more than two years growth; they are notoriously somewhat slow, but like most things of slow growth, they are enduring.

Six Exotic Trees of first magnitude both as it regards size and beauty.

European Linden—An exceedingly handsome tree, good in all respects.

English Elm—A noble tree.

Norway Maple—Resembles our Sugar Maple; a beautiful tree.

Sycamore Maple—A splendid, broad-leaved, lofty, handsome tree.

European Horse Chestnut—A charming tree both in foliage and flower, with dense, round head.

European Larch—An elegant, tapering, light foliaged tree, valuable for timber.

Six Smaller Exotic Trees, hardy and do well here except where noted.

White Birch—Remarkably handsome tree.

Mountain Ash—Not a success here.

Kolrenteria—Does well, but hard to transplant.

Catalpa—Hardy, handsome, transplants easily, grows rapidly.

Chester—Hardy, transplants easily, fine silvery foliage.

Service berry—Not common in nurseries.

Six or more Small Trees, the connecting link between trees and shrubs.

Euonymus—Several kinds, very handsome fruit in fall; colors, rose, red, white, &c.

Bird Cherry—Exceedingly beautiful small tree.

Snowy Mespilus—As above; flowers a moss of snowy white.

White Fringe—Native; beautiful foliage, handsome fringe-like flowers.

Silver Bell, Halsea—Native but rare here; wonderfully pretty.

Magnolia Glauca—Fine foliage, flowers of delicious fragrance.

EVERGREEN TREES AND SHRUBS.

Six of the Finest and Best Evergreens, holding the first rank here.

Norway Spruce—Noble tree, growing one hundred feet high; best in all respects.

Hemlock Spruce—Native, handsome, but not so much at home in the West.

White Pine—Noble, beautiful; a great timber tree.

Austrian Pine—Stiff, stately tree; does well here.

Scotch Pine—Rugged, hardy, rapid growing, desirable tree.

Red Cedar—Not the handsomest, but valuable.

Six Evergreens second only to the above.

Corsican Pine—Hardy, fast grower, not so handsome as some.

Bentham's Pine—Hardy, not in the nurseries.

American White Spruce—Native, fine foliage, silvery hue, small cones.

Black or Blue Spruce—Native, foliage glaucus, very pretty.

Red Spruce—Somewhat resembles the Norway.

Balsam or Silver Fir—Very erect, dark green, hamdsome while young.

OTHER EVERGREEN TREES AND SHRUBS.

European Silver Fir—Noble tree, hardy, but hard to get up here.

Nordman's Silver Fir—Undoubtedly hardy here, a splendid tree.

Several others of this beautiful genus would unquestionably prove hardy here, as there are several of them hardier than the common Silver Fir, which is tolerably hardy; these are Pectinata Grandis, P. Lassiocarpa, P. Nobilis, all wonderfully handsome trees.

Cembram Pine—Small, compact, very handsome.

Mountain Pine—Dwarf, valuable as a low evergreen.

Banksian Pine—Hardy, rugged, not handsome.

Norway or Red Pine—Quite handsome.

Many other pines might be added, but are either scarce, high, priced not well proved or not desirable for lack of beauty, etc.

American Arbor Vitæ—Hardy, desirable, as are all its varieties.

Chinese Arbor Vitæ—Handsome while small, not as hardy as the preceding.

Siberian Arbor Vitæ—Hardy, with glaucus hue, dense habit.

Lawson Cypress—Hardy here, a lovely evergreen.

Nootka Cypress—Will prove hardy, very distinct.

Silver Cedar—A recent acquisition, of singular beauty, hardy.

Irish Juniper.

Swedish Juniper.

English Juniper.

Savin or Dwarf Juniper—These are all hardy, very handsome small trees, indispensable in small gardens. Indeed, for garden scenery nothing in the entire range of evergreens can be more appropriate, producing the most complete effect in a small space.

Weeping Japan Juniper—There are a number of other varieties equally hardy and valuable.

American Yew—Desirable to mix with the junipers for a low evergreen.

Tree Box—Beautiful evergreen, not enough appreciated.

Mahonia—Splendid for masses in the shade of other trees.

Pyrecantus—White berried, beautiful dwarf evergreen.

List of Flowering Shrubs, with the color of the flowers, given somewhat in the order or season of flowering:

Forsythia Viridissima—Deep green color, yellow.

Forsythia Suspenta—Trailing, yellow.

Forsythia Fortunii—New, not tried here.

Amygdalus Nana—Double Dwarf Almond, pink.

Amygdalus Nana Alba—White.

Pyrus Japonica—Japan Quince, quite early, scarlet. There are half a dozen varieties of this beautiful shrub.

Ribes Aureum—Missouri Currant, early, yellow.

Spirea Prunifolia—Plum-leaved, white.

Spirea Ulmifolia—Elm-leaved, white.

Spirea Reevsii—Lance-leaved, white.

Spirea Reevsii plena—Double lance-leaved, white.

Wiegelia Rosea—Beautiful rosy red.

Deutzia Scabra—Rough leaved, strong grower, white.

Deutzia Crenata—Crenate-leaved, white.

Deutzia Crenata plena—Double white and pink, very handsome.

Deutzia Gracilis—Slender, very pretty dwarf shrub.

Viburnum Opulus—Snowball, large, showy, white. Of this old favorite there are several new sorts, all doubtless hardy, as Nanum dwarf, Plicatum, new and fine.

Magnolia Purpurea—Purple Magnolia, magnificent, purple tulip like flower.

Syringa Vulgaris—Lilac. The old purple, white, and a dozen new varieties, all hardy and desirable.

Syringa Persica—Persian Lilac. Several varieties, various colors.

Philadelphus Coronaria—Mock Orange. Several kinds, all good, white.

Chimanthus Virginica—White fringe.

Calycanthus Florida—Sweet scented shrub, or alspice, brown.

Halesia Tetraptera—Silver bell, white, beautiful.

Lonicera Tartarica—Upright honeysuckle, red and white varieties.

Lonicera Ledebenrii—New from Oregon, crimson flowers.

Lonicera Xyloxteum—Fly honeysuckle, straw color.

Berberis Vulgaris—Barberry, yellow.

Berberis Purpurea—Purple-leaved, yellow.

Buddlea Lindleyana—Neat, graceful shrub, Lavender flowers.

Corchorus Japonica—Japan globe flower, yellow.

Colutea Arboreseers—Bladda Lenna, yellow.

Colutea Crenata—Bladda Senna, red.

Cornus Sanguinea—Dogwood, white flowers, blood red branches.

Amorpha Fruiticosa—Indigo shrub, purple.

Robinia Hispida—Rose Acacia, pink.

Hypericum Kalmianum—St. John's wort, yellow.
Hypericum Prolificum—Profuse flowers, yellow.
Spirea Sorbifolia—Mountain Ash-leaved, white.
Spirea Donglassii—Slender dwarf, red.
Spirea Billardii—— ——, white.
Spirea Lindleyana—Splendid spikes, white.
Spirea Bella—Beautiful, red.
Spirea Corymbosa—Large, showy, white.
Spirea Aurea—Golden-leaved, pretty.
Paria Macrostacya—Dwarf horse chestnut, long spikes, white.
Eleogenus Argentea—Pretty silvery foliage.
Eleogenus Parviflorus—Small leaved.
Hydrangea Quercifolia—Oak-leaved.
Vitex Agnus Castus—Chaste tree, kills down, but comes up every year, blue.
Hallicarpa Cerulea—Elegant, violet berries.
Hybiscus Syriacus—Rose of Sharon, many varieties, various colors.
Hybiscus Varigata—Varigated-leaved, beautiful foliage, one of the plants we might select for ribbon work in foliage plants.
Ligustrum Vulgarus Privet—White flowers, black glossy berries.
Clethra Alnifolia—Pepper bush, white.
Tamarix Indica—Beautiful feathery foliage, pink flowers.
Symphoria Racemosa—Snowberry, pretty, white fruit.
Symphoria Glomerata—Our Indian Currant. There is a beautiful varigated-leaved kind.
Enonymus Europeas—Strawberry tree, handsome red and white fruit.
Rhus Cotinus—Veneticin Sumac, or purple fringe mist tree.
Eglantine—Sweet Briar, fragrant foliage.
Wigelia Amabilis—Pale rose blooms nearly all summer.
Wigelia Hortensia Rubra—Deep red, strong.
Wigelia Nivea—A variety of roses with white flowers.
Wigelia Varigata—Varigated foliage, does not flourish first rate here.

There is a number of new varieties of Wigelias that I have not seen, therefore cannot speak of them to recommend.

Prof. Root, of Columbia, thought the report just read, complete, and moved that a committee be appointed to make out a short list of those plants that could be recommended generaly for small places.

H. M. Vories has tried the planting of ornamentals for 20 years in Missouri; has succeeded with some, and feels the want of a short list of those that can be recommended everywhere in the State.

Instanced a gentleman making out a list containing most of the spruces. Suggested to him to visit some place where they were growing, took him to Mr. Shaw's. When he saw this splendid collection of plants, it changed his mind so much, he hardly took one of his

original list. He took some of the pines. We should plant such as keep green in the winter. The Norway Spruce, Austrian, Scotch and white pines. The Cedar and Arbor Vitæ are bad in their color.

Dr. Spalding thought no time of the Society could better spent than at such a list.

J. Henwood: the Dr. has overlooked the fact that no six or twelve that we can select will suit every taste. Let us get a full list as we have heard read, and let every one suit his own taste.

The following committee on small list was appointed, with instructions to report to this meeting: Prof. Root, Carew Sanders, J. M. Jordan, Charles Connon.

H. T. Mudd moved the following resolution:

WHEREAS, a proposition has been introduced into our State Legislature looking to a diversion of the agricultural and mechanical grant of Congress from its intended use; and, whereas, for the improvement of our agriculture and horticulture we need continued and extensive experiments, carefully organized instruction, and widespread scientific information; therefore,

Resolved, That the State Horticultural Society, in behalf of the horticultural interests of the State, most earnestly protest against any such diversion, and urge upon our Legislature to perfect arrangements for the opening of the college provided for in the Congressional grant.

Prof. Root, Dr. Hull, Mr. Vories, and Col. Colman made a few remarks on the subject, when it was made the special order for the evening.

Adjourned.

WEDNESDAY EVENING.

The President called attention to the fact that Mr. Samuel Miller, of Bluffton, had kindly presented the Society with some packages of the seed of the "Bonnet Gourd," and of the "Northern Ramie" plant.

Dr. Morse wished it to be understood, especially by the ladies, that the Northern Ramie was a nettle, the *Urtica Purpuracea*, and was a coarse, stinging weed, found wild in many parts of the State; thought the fibre very fine, and that it might be found available as a textile fibre. The remarks of several gentlemen showed that it was common on rich soils on the Missouri, Mississippi, and Illinois rivers.

Prof. John J. Hodgen was then introduced and delivered a lecture on "The Diseases of Vegetation." He said: I will not discuss any particular disease, but will, in a general way, make some remarks that may lead to results that may be of value. To know disease we

must be familiar with the healthy condition, structure, and functions, and how these healthy conditions may be maintained and built up. We must assume there was no disease; all was perfect when it came from the hands of its Maker; that there was a period of health; no disease existed, and that by some circumstance a change was effected. There are some things essential to vegetable life, as moisture, light, air. Water gathers carbonic acid from the air. It descends into the soil to nourish the plant. Water gathers nitric acid from the atmosphere, and it is carried by the water to the roots of the plant. Water carries the salt in the various formations, and prepares them for the vegetable organisms. They can be used by the plant only when in solution. Water is the great solvent, so that a proper supply of water is essential. Seed will not germinate without water, and will remain, if dry, at a temperature of 70° to 100° for a long time, but add moisture and germination at once takes place when along with the proper degree of heat. It does not matter what salts or other food is presented, unless water be present with it. In reference to the plant itself, in most vegetable organisms there are distinct tubes that lead up materials in solution, as in the trees of the forest. In other plants there are only open interspaces, as in the sandy soil. Before the materis can enter into the single cell, whether of fruit, or flower, or leaf, or stem, it must be in a state of solution, or it cannot parter or form a part of the cell wall. Cells grow by the process of expansion; crystals grow by deposit. The materials may be in particles beyond the reach of the microscope, but they have still the power of passing through this porous membrane, the wall of the cell. They thus are the particles of the wall, and become a portion of the living plant. While the water may be regarded as the drink of the plant, it is the food also. This food must be obtained in proper quantity and proper condition. We can determine by chemical analysis as to what is wanted by the plant. The soil may not contain the phosphate of lime in the particular *condition* that the plant requires, and *this* may not be recognized by chemical analysis. It might be present, but required a change in its condition that the plant could not make, and we could not determine by chemical analysis in what that change consists. Thus in the case of gum, starch, or glucose; or in cane or grape sugar the elements may be present and recognized, but the causes that determine the form that the starch will assume as to being cane of grape sugar may not be appreciable. The air has supplied the carbon, that is the base of all these several forms. We must also have air to our plants, and this air must be in a certain condition. It must not be too dry, or the atmosphere will absorb too much moisture and the plant dry up; nor too moist, or the moisture will remain in drops upon the leaves, and the sap remain stagnant in the plant. The atmosphere must contain the proper chemical elements, and these in a proper condition and in proper proportions. Heat or temperature is of great importance to the plant. The changes in the

temperature may be too sudden. Sunlight is needed by the plant. A few days cloudiness causes the young corn to become pale. Carbon is not taken in, and it lacks carbon. Look at the potato grown in a dark cellar. They are *etiolated*, and contain little of the material that makes the potato. Without going back to ultimate causes, there is something that determines and controls the forces that are in action, from the building of the cell all through its operations, that regulates what it shall pass by and what appropriate from the common supply of material that is presented to the plant. It may be that the molecular form of arrangement of the particles has something to do with it. There may be something yet unnoticed that controls it entirely.

The cause of disease may be found in any one of the conditions to which we have referred.

Changes in the air, heat, moisture, sunlight, may cause changes that will produce disease. There are also accidental changes which may give cause to disease. Accidental causes may impair or destroy the functions.

As to food, if the soil does not contain the food the plant requires, it dies. The change in the quality may be very trifling, but it cannot take its place in the organism, or it has not the power by which the material has to be transposed. Too much fluidity in the body and disturbed functional action, and dropsy will be produced.

A proper amount of air in a proper condition is necessary to the growth of the plant. The air is like a stimulant, causing an increase in the action of the forces of the plant, and may be too little or in excess as in "stimulants" in the human system.

Disease may be produced by accidental causes, as in the case of the oak gall, which is produced by an insect acting on the leaf and the boring admits the air and converts the tannin of the plant into tannic acid, and the cells, instead of forming in parallel lines around this centre, and furnishes all that is necessary for the development of the insect's egg.

Different insects produce different results, in changing the direction of the forces in the plant, so that some destroy in one way and some in another. So it is with smut. Sometimes it is produced and developes more rapidly than others; sometimes consuming the entire grain and converting the head of wheat into a thick black mass, sometimes affecting only a few grains.

The seeds of the fungus are sown with the seed, pass up the stalk into the grain, and circulates in the minute vessels to carry on the process. The seeds or germs of this fungus are exceedingly minute, about one-sixteenth-thousandth part of an inch. The rot in the grape, the mildew on the leaf, destroy the substance of the fruit or leaf in a similar manner. The changes that take place in the tissues of the plant is much like the chemical changes that take place in the starch or sugar in fermentation. Starch changes into sugar

and alcohol and carbonic acid gas. We have a similar case in the potato rot.

A reference to the conditions of vegetable life, action and disease will stimulate to inquiry and discovery.

Mr. Riley wished to know if plants do not grow in winter?

Prof. Hodgen: I think that they do grow. Prof. Draper shows this point in secretion, a higher temperature is produced in the plant than in the atmosphere.

Mr. Riley referred to the fact that Mr. Meeham said that in the Hyacinth it produced so much heat as to thaw out the frozen ground in a ring around it in the winter.

Prof. Root, from the committee on select list of trees and shrubs, presented a report which was accepted and laid over till after the special order.

Prof. C. V. Riley, as chairman of the committee on Entomology, read a report, which will be found in his general report on Entomology in this volume.

After the reading of the report, Dr. Hull said that in regard to the curculio he had data in regard to its appearance and changes.

Last year the first curculio was seen on the 20th of June, this year the 25th of June that the first insects left the peaches, twenty-two days to transform brings us to July, eight days to perfect the insect. One year the curculio delayed till June 20th, the other till July because the weather was wet and cold. It was so this season; we had many days that were cold and damp, and our late peaches have but few worms. They are badly stung, but very few worms are found, because the peaches were not sufficiently matured. When late peaches reach the period of stoning, they rest in their growth for some time; while the early varieties rest only a very few days. I think there is a mistake as to when the curculio lays the eggs in the fruit and when they come from the fruit. It is true that this year I find a few in August, but very few. This year I find them later than ever, a few as late as the first of September. I think there is no two broods.

Mr. Riley: I said that by the end of June and beginning of July, the new brood came out, that a portion had wintered in our woods and the rubbish of our clearings. The brood which wintered over produced the brood that we have had this year.

The curculio winters over principally as a beetle; these puncture the fruit to deposit their eggs, which hatch out into worms and fall to the ground. There are always a few stragglers from the regular brood.

Dr. Spalding: How can this late brood injure the fruit?

Mr. Riley: They do much damage in their desire for food, not in laying their eggs. They made round irregular gougings.

Dr. Hull: I find that there is no difference of opinion between us; this explains all.

Mr. Sigerson made some inquiries as to the "weevil," but as so many insects that affect the wheat are called weevil, it is difficult to get at the correct facts without having the insects referred to at hand for identification.

Dr. Hull would like to ask Mr. Riley if the planting of crab apples round an orchard, or among the trees, would be any protection to the cultivated varieties from the humpbacked curculio?

Mr. Riley: I think so.

Mr. Colman: Will it take the wild crab in preference to the cultivated apple?

Mr. Riley: I think so. I have found forty punctures in the crab for one in the cultivated apple near it. I only answer from general principles, I cannot speak as a demonstrated, practical fact.

President Peabody: I notice that in Europe they are much more free from insects than we are, and yet Europe is the natural habitat of many of our most troublesome insects.

Mr. Riley: It seems that they have the natural parasites of those insects. We have introduced these troublesome insects without the natural parasite. I believe the insects of Europe are the younger and more powerful race; that the European insects predominate over the native as the European race is doing to the "red man."

Dr. Hull thought that temperature had also an influence in this case.

The English sparrow and the Apple-root aphis were hurriedly noticed.

Adjourned.

THURSDAY MORNING.

The meeting was opened by prayer by the President.

H. M. Vories: Wished that the place of holding the next annual meeting be brought up, and desired to have it at St. Joseph, pledging the active co-operation of the local Horticultural Society, and citizens of St. Joseph.

Postponed.

Special report of trees and shrubs was presented and accepted, but gave place to the special order.

The Secretary then read an

ESSAY ON PRIMITIVE SOILS, THEIR SPECIFIC CHARACTER FOR HIGH GRADE WINES.—BY JOSEPH E. WARE.

In discussing this subject, I shall find myself unaided to a greater extent, than I had expected in the outset. In the preparation and arrangement of the thoughts and facts herewith presented, I often

have thought there were many subjects I could have selected, so much easier to treat than the present one; where the task would have been one of collation and amplification, rather than wandering through paths so little trodden. I will, however, offer no apology, as I have the monition before my eyes that I must not trench upon other people's time. I consequently only hope to be able to direct attention to a district in Missouri, that is as large as the wine district of France, and larger than that of Spain and Portugal combined. This territory contains 5,300,000 acres of land, the soil of which is derived chiefly from the decomposition of crystaline rocks. These rocks are usually termed primitive, or first rocks; hence, the soils derived from such rocks are denominated *primitive soils*.

To understand the natural history of the substances that produce primitive soils, and to make the subject plain and easy of comprehension, is to my mind almost an impossibility.

How can simplicity be given to a subject that involves the concrete sciences of Mineralogy, Botany and of Zoology, together with the abstract sciences of Chemistry and Physics? When it is further, considered, that the whole process of development of our earth from its birth to the present period, sustains a necessary and very important relation to these sciences, which, when aggregated, become grouped under one name, Geology.

Nearly as much has been learned of the constitution of our own globe, by observing through that marvelous instrument, the Spectroscope, the composition of the far-off extra-terrestrial matter of which is made the sun, the planets, the fixed stars, and the farthest bodies of the universe. Many things and points upon which but little light could be thrown, on account of the impotency of the agents and the means employed, are now better understood, and through the same agencies, the career of discovery and investigation has been widened. In the examination of the elements and substances composing our own planet, modern science shows the existence in the sun, and in the many other luminous bodies in space, of chemical elements precisely similar to those met with in our earth, and our own bodies, and it is with something akin to intuition, that the poet genially

> "Sees alike in stars and flowers a part
> Of the self same universal being
> That is throbbing in his own mind and heart,"

As to the character of soils, and even waters and air, modern chemistry has made known some curious facts, which will help to throw light upon certain phenomena and conditions in soils that have hitherto been veiled in obscurity. Properties have been observed in soils, in currents of water and air, that indicated the presence of elemental matter that hitherto had not been revealed in the laboratory. Who can account for the chemical relations that exist between the water in the Gulf Stream and the disseminated heated particles that

maintain an extra elevation of temperature in that mysterious ocean river?

Nor is there any satisfactory explanation regarding the phenomena so-called *isothermalism*. Is there any analogy in the causes that heat certain zones or provinces, so easily termed "isothermal lines," and such heated lines of water as the great black river of the Japan sea and the Gulf Stream?

These questions are at the threshold of the question. Still it is interesting to make the inquiry, whether belts or provinces of equal temperature are not of necessity confined to the crystaline ranges of rocks, and soils resulting therefrom? as it is not at all a difficult task to show *why* all primitive rocks, and the soils derived from them, should possess qualities of heat that cannot be found present in more recent stratified rocks and soils.

As this appears to me to be a strong point, it may be possible that here lies an explanation of the noticeable circumstance that, almost without an exception, the high grade wines of the civilized world are produced upon primitive soils: instance, the Rhinegau, Burgundy Lisbon, Cadiz, Madeira, Teneriffe, Cape of Good Hope, etc. From all all these localities wines are obtained that range on a scale of quality from very good up to super-excellent.

As temperature is another element in the production of wines of high body, both in alcohol and sugar, deliciousness and odor, it is a circumstance that is remarkable that a September mean temperature of 67° on the Missouri river bluff ranges, has at Pilot Knob 71°. While the October mean of 49° on the Missouri river is only exceeded by 2° at Pilot Knob. This comparatively low maturation mean is in a measure compensated for in the dryness of the air and the amount of heat in soil. It would appear from imperfect observation, that in Arcadia Valley there are 153 days above a mean of 64°, not counting any part of October.

The following grapes will fully ripen in Iron, Madison, Wayne, Reynolds and Bollinger counties in 140 days, to wit: Delaware, Hartford Prolific, Clinton, Diana, Concord, Isabella, Rebecca and Catawba. The first three named will perfect themselves in 125 days from leafing.

In the Paris Exposition report of the committee on the culture and products of the vine, to the United States commission, we are assured by a very competent committee, Marshall P. Wilder, Alexander Thompson, William J. Flagg and Patrick Barry, "That all that is necessary for us (the United States) to rival the choicest products of other parts of the world, will ere long come with practice and experience. We have already several excellent varieties of the grape borne on American soil, and suited to it, a soil extensive and varied enough for every range of quality and quantity. Who would discover a patch of ground capable of producing 'Johannisberger,' a 'Tokay' or a 'Margeaux,' need only make dilligent search and, somewhere between

lakes and the gulf and the two oceans that circumscribe our vineyard territory, he will be sure to find it."

There is but little reputation hazarded in this latter assurance, with so many thousands of millions of acres of territory to make the discovery in. It is therefore all the more gratifying to me to believe that the very desirable locality is to be found in our own State of Missouri, and need not be limited to the dimensions of a "patch," nor yet a good-sized county. No entire county is, however, exclusively trapeau or primitive, as many of the valleys have sandstone, talcose slates, laurentine and third magnesian limestone, to afford, with the surrounding granite or trap hills, an almost incomparable soil for all grades of wines, such as Liertenberg, the best Rhine wines, Vienna and other still superior wines.

When the foot slopes of the hills that are largely augitic to the elevation of 200 feet, are chosen, with a due regard to protection from prevailing winds, I would not venture to say that "Lacrimae Christi" or anything so extremely luscious could be expected. Whereas, the conditions with such varieties of grapes as the Kleiner Riessling, Hermitage, Pineau and Muscat of Europe, and Concord, Cynthiana, Virginia and Rulander, of home varieties, will afford us all the rich, sweet wines of Frontignac, Riversaltes, Malaga, Alicant, and possibly the equivalent to the "Pedro Xemimes." That all such wines will have high alcoholic qualities is admitted.

Passing from products, I will assign reasons, that I hope will be satisfactory, for the purpose of showing that primitive soils are undoubtedly preferable for the production of fine wines, such as will gratify the general American palate, for it is a terrible mistake to suppose that wines, such as emanate from Hermann or Cincinnati, will ever be more than passably acceptable to the American people.

With all deference to the worth and successful industry of the German vignerons of Ohio, Indiana and Missouri, there is something better craved for. A dry wine will always stand secondary with the American and English tastes.

Of what in France and Germany is called "basaltic soil," or volcanic, we have in Missouri fully one million acres.

Many imagine that all hilly land is necessarily volcanic; far from it. There is not an acre of volcanic soil in Ohio, Indiana, Illinois or Iowa.

Missouri is consequently the only State in the valley of the Mississippi that can possibly cope with Europe in the future wine market against those famous varieties of wines. Those marvelous combinations of rich flavor, delicacy and strength, that culminate in indescribable qualities, more commendable to the organs of taste than to the rational faculties.

No organic matter can form plant food, unless subjected to decay and resolved back into inorganic elements and compounds; these are carbonic acid, water and ammonia, the final products of putrefac-

tion, but with carbonic acid, ammonia and water, silica, potash, phosphate of lime, soda, sulphate and oxide of iron, must be associated, and other ingredients that escape the keenest observation of the analyzer.

The analysis of a plant gives the surest indication of the soil ingredients required for its perfect growth.

Five analyses by Liebfrauen and Gratz, as presented by Johnson, of grapevines: one, the growth of a limestone soil, and four grown upon primitive soils, reveal the fact that the mean of mineral ingredients demanded in the formation of a perfectly developed grapevine cannot be found in a strictly calcareous soil, and cannot be obtained by the vine, unless, as at Diedesham, primitive soil is supplied, and in fact the least favored parts of the Rhinegau, where basaltic or primitive soil is used as a manure.

The mean of mineral ingredients demanded, as said before, digressing, is in 100:

Potash	25.60
Soda	11.07
Lime	34 85
Magnesia	7.64
Oxide of Iron	1.25
Phosphoric Acid	15.37
Sulphuric Acid	2.36
Chlorine	0.68
Silica	1.22
	100.04

A limestone soil, at best, can scarcely exceed 7.30 as its mean of soda, but, says a very voluminous writer upon every soil in Missouri, but the soils of our primitive rocks, "lime may supply the place of *soda* and potash," it is very doubtful if it does, though.

The equivalents to the basaltic soils of Europe are derived, in Missouri, from augitic trap, toadstone, dolerite, clinto-stone or gray basalt, trachyte, &c. Not a soil or rock, in the high-grade wine districts of Europe, fails in finding a congener in Missouri, and as this subject is a new question in Missouri, I will show, from analysis, that the primitive sub-magnesian rocks are more truly the source of indispensable elements in a grape-yielding soil, than any calcareous soils *can be*, when the object sought is excellent to super-excellent wines.

ANALYSIS OF PRIMITIVE ROCKS

gives for *Feldspar*, in 100 parts:

Silica	64.78
Alumina	18 38
Potash	16.84
Apatite (Phosphate of Lime)	92.1

Fluoride of Calcium	7.9
Chloride of Calcium	0.9
Magnerite (Carbonic Acid)	52.4
Magnesian	47.6
Alumnite (Sulphuric Acid)	38.5
Alumina	37.1
Potash	11.4
Wavelite (Alumina)	38.8
Phosphoric Acid	34.9
Albite (Silica)	68.5
Alumina	19.3
Soda	9.1
Andersine (Silica)	59.6
Alumina	24.2
Lime	5.8
Potash and Soda	7.6

I might follow on with the Schorls, Pectolite, Augite, Oligoclase, Hornblende, Dutholite, Dolerite, Natrolite, Lepidolite, Lucerite, and many other rocks rich in soil elements, all of which go to endow the soils, resulting from their decomposition with qualities that may be sought in vain, in soils derived from strictly calcareous bases.

Primitive soils are absorbents in the highest degree, in proportion to the greater number of ingredients that invariably belong to their composition; not from the attraction of moisture by deliquesent salts, but the power of withdrawing moisture from the atmosphere, by absorbing or sucking it into their pores as a sponge does water. However inherent this property is in those soils, nothing of the sort will justify less thorough cultivation than for any other soil, and, admitting that the fertility of a soil chiefly depends upon its capacity for imbibing moisture, consequently the more a soil is divided by labor, the greater is its absorbent power and superior fertility; hence the advantages to be found in the cultivation of our primitive soils are, that the same labor and attention that other soils *must* have to assure a good result, will, no doubt, be decidedly a *superior one* in the other case.

Lest the foregoing remarks should have the appearance of unsupported assertion, I will introduce the experience of two very truthful and respectable gentlemen, Mr. A. W. Hollowman, of Arcadia, and Mr. G. F. Van Hees, of the same vicinity.

Mr. Hollowman has had eleven years' experience upon the eastern slope of a whinstone trap hill, both rocky and gravelly, and with a thin, though good soil, has, with the disadvantages of exposure and want of attention, a small vineyard that is remarkable for the delicious and delectable flavor of the fruit. Of the wine product I had hoped to have been able to speak advisedly, but failed in getting reliable information.

The vineyard of Mr. Van Hees is but seven years old, and con-

tains 4,000 vines, it is situated on the side of an augitic hill, fully 700 feet above the gulf, with a very thin and poor soil. In a letter he says: "The yield per acre on my farm is not very large, but cannot be a criterion of as to what it could be under other circumstances (proper attention.) The wine of the Catawba is of a very fine quality. The Catawba does well. The Diana and Rebecca are also hardy vines, and do well on my place. The Delaware is a splendid bearer. The Concord is very hardy and has a beautiful growth. The berry is large, of a fine flavor, it is also an excellent bearer, and in every respect I consider it the most profitable and the best suited to our soil. I have never seen a rotten berry on the Delaware. I have no doubt it makes a fine quality of wine. Last years' wine (1868) was not of good quality, the vines having suffered so much from the "locusts," the grapes did not ripen well. This year (1869) wine will be fine when made, it is still fermenting. I shall be happy to send you samples of it as soon as practicable."

Under circumstances that completely demoralized both of the small vineyards cited above, this much appears to be made, particularly by Mr. Van Hees: *any grade* or *quality* of wine can be produced on his or other analagous soils, with greater exemption from disease than elsewhere in Missouri.

There are many localities in view at present, and hundreds are to be found, vastly preferable to the two brought to notice. With but limited time and space, I find myself quite unable to do this subject justice. Materials, unwrought, must bide their time. Particularly with regard to such as require width of space, as "Spectral Analysis, as a means of detecting certain properties, that may have a bearing in giving grapes and other fruits special qualities.

Also, "the sources of heat in chrystaline rocks, and soils derived from such sources."

If in this, I succeed in turning attention to the claims of this part of our State, upon the careful investigation and patient vigneron, I shall be repaid most amply.

President Peabody here called the President elect, Dr. Claggett, to preside over the deliberations of the society, thanking the same for their kindness to him during the past two years, during which he had been President and expressing an earnest hope in the progress and welfare of the society.

Dr. Claggett, on assuming the chair, said:

Gentlemen of the Missouri State Horticultural Society:

Before entering upon the discharge of the responsible duties you have devolved upon me, allow me to tender you my sincere thanks for the honor you have been pleased to confer upon me.

This honor, gentlemen is the more gratifying because it was unexpected, and especially from the spontaneous and almost unanimous voice by which it has been confirmed.

For the interests of horticulture I could have wished you had committed the important duties of this office to other hands. But the unanimity with which you have called me to this responsible as well as honorable position is the best assurance that my lack of ability will be supplied by your able support and cordial co-operation in carrying forward the objects of this organization.

Confiding, therefore, in your strength and support, I accept the situation with less diffidence on account of my own weakness.

Esteeming the honor, I shall endeavor to appreciate the responsibility, and bring to the discharge of the duties assigned me my best exertions, trusting that my short-coming will receive your generous forbearance.

Allow me, in conclusion, to say that, in all our deliberations, however we may differ in our opinions in the twilight of our progress, as we advance in the sunlight of truth, we may show by our mutual forbearance and courtesy a unity of purpose, to the advancement of horticulture, the elevation, adornment and happiness of our race that we manifest to all who come within our circle, "how beautiful and how pleasant a thing it is for brethren to dwell together in unity; it is like the oil that ran down upon the beard, even Aaron's beard, which ran down the skirts of his garments; as the dew of Hermon that descended upon the mountains of Zion; for there the Lord commanded the blessing, even life forevermore." To achieve this we will now proceed to our work.

A paper was then read by Mr. Geo. Husmann:

VARIETIES OF GRAPES IN MISSOURI, DURING 1869.

You have requested me to give you my experience and observations of the last summer, and I will try and do so in as concise a form as possible.

I need not tell you that the last season, with its superabundance of rain, was one of the most trying ones to the grape grower as well as to the varieties he cultivated. But such seasons have their advantages as well as their disadvantages; they are the stern teachers of the observing vintner; they will show him better and more clearly what locations are preferable, what varieties can be depended upon, than ten summers of continued fair weather, and he knows that the varieties which have withstood such trials must have constitutions like the oaks of our forests, and he can trust to them in future. They also show him that the grape, if judiciously selected and properly managed is a more reliable crop than any other we grow, for they naturally lead him to the conclusion that if a fair crop can be made in a season like this, he can depend upon it always. They are the unrelenting task masters of the negligent, as they clearly demonstrate the necessity of taking advantage of every hour, which can be snatched between showers, to perform the necessary work, and show plainly that a lazy man cannot choose a profession less adapted to his

natural propensities. Therefore, let us thank Him who sendeth them, for the storm as well as for the sunshine, for all bring their blessings and their encouragements if we will but receive them in the right spirit and profit by their lessons.

Concord has rotted considerably, we think on an average about one-third of the crop. As our crops at Bluffton are nearly gathered, we can form an estimate of the average yield per acre, and find it about 4,000 lbs. Most of this was, however, on vines in their third summer, and not by any means a full crop. It has rotted least with long pruning on spurs or laterals, and on that kind of river bottom soil commonly called "gumbo," a tenacious black soil underlaid by sand, where the Norton's do not succeed well.

Clinton has suffered much from the gall-fly, and is almost devoid of leaves; the fruit ripens unequally in consequence. Very little rot on sandy soil but presents rather a sorry appearance.

Cunningham looks well in fruit and foliage, and we are satisfied of its value here.

Catawba has rotted and mildewed badly here and at Hermann; probably three-fourths of the crop, and the remainder ripen very unevenly.

Cynthiana, perfectly healthy, as usual, and shows a full crop of well-ripened fruit.

Delaware, the foliage mildewed badly, and the leaves dropped early in the season, consequently the fruit did not ripen well. Free from rot, and yielded with us at the rate of four thousand pounds to the acre.

Goethe, this has stood the season remarkably well, with sound foliage and little rot in fruit. We are glad to have our early predictions of its value for the West so fully verified by all who have tried it. We expect to see it take the place of the Catawba, of which it possesses all the good qualities for wine and the table without its diseases, and we can now fearlessly recommend it for general culture.

Hartford Prolific produced very well, and rotted but little.

Herbemont lost some of its fruit by a kind of blight or dry rot, but still has an abundant crop, with healthy foliage.

Ives is not an early bearer, consequently had not much fruit the third summer. Seems to be healthy and vigorous; no rot, or very little.

Maxatawney is also not an early bearer, but the little fruit it had was healthy, also the foliage; and at Hermann it produced well on older vines. We think it can be safely recommended.

Martha rotted much less than Concord; is reliable and uniformly productive.

Norton's Virginia, no rot worth mentioning; some mildew on foliage; has an enormous crop here, the largest we ever saw, and seems to be particularly at home on the sandy lands of our river bot-

tom, where the fruit is larger, finer and more abundant than we ever thought it possible to be. It has again proven that it is one of the most reliable grapes we have.

Rulander has a fair crop of fruit, sound in foliage, and can also be relied upon. What the fruit may lack in quantity, it will make up in quality for wine. Should be planted on Southern exposures.

Taylor, we hear good reports of it from Hermann; and what few vines we have here on the hills did moderately well; in the bottom it dropped its leaves badly, foliage blighted and very little fruit. It has rotted some everywhere, we believe, and altogether the summing up does not seem to be very favorable.

Telegraph, this has stood the summer remarkably well, with clean, vigorous foliage and healthy growth, and but very little if any rot of fruit. It seems not to bear very young, but after the third year may be relied on for a full crop, and its fruit is certainly the best of all the very early varieties, and will make a very good wine we think.

Antuchon (Arnold's No. 5), some mildew on foliage; has made a fair growth the first season.

Adirondac, slow grower and poor bearer; hardly worthy of further trial.

Agawam (Rogers' 15), mildewed and rotted badly; has always been subject to disease as long as we have had it.

Allen's Hybrid, only an amateur's grape. Fine quality, but tender and subject to disease.

Anna, unworthy of culture here. Poor grower; subject to rot and mildew.

Alvey, has mildewed baldly in the river bottom, where it did well last year. The grape is so good that we shall give it further trial, and yet hope to succeed in finding the proper locality and soil.

Brant (Arnold's No. 8); fair growth; some mildew on leaf.

Barry (Rogers' 43), rotted and mildewed badly here.

Black Hawk, healthy in foliage. We have not fruited it here, but have good hopes of it.

Blood's Black, tolerably healthy, productive, and very early. For an early market grape, it is very desirable, though not very good in quality.

Berks, or Lehigh, suffered from the same diseases as the Catawba, but is of better quality. We will test it further.

Cassady dropped its leaves on southern exposures, but did well on eastern and northern slopes. No rot but some mildew on foliage.

Clara, only an amateur's grape, but better than Allen's Hybrid, and more healthy. One of the best in quality, but too tender for general culture.

Canada (Arnold's 16), very good grower, and tolerably healthy.

Creveling—Has done well on southern exposure, but behaved

badly in the bottom and on eastern and northern slopes. We cannot as yet, form a conclusive opinion of its merits.

Cornucopia (Arnold's No. 2)—Strong grower, and healthy.

Diana—Mildewed and rotted like its parent, the Catawba.

Devereux—Mildewed considerably, though we are loth to give it up, on account of its superior quality.

Golden Clinton—Resembles Taylor closely in fruit, but seems to set better foliage like Clinton. Subject to the gall fly.

Hermann—Healthy, vigorous and productive again. We think it can be safely recommended as a wine grape for this latitude and further South.

Hettie—Much like Isabella, but at least not better than it. Unworthy of culture here.

Huntington—Set an abundance of fruit, but rotted and mildewed badly. We think it decidedly a poor stick.

Iona—Suffered from mildew and rot, but not quite as bad as the Catawba. Is very unreliable here.

Israella—A very poor bearer, and suffered a good deal from rot and mildew.

Louisiana—Sound in foliage and fruit here, but mildewed somewhat at our former vineyards, at Hermann. Bore splendidly at Mr. Munch's vineyards in Warren county, Missouri. Should be extensively tried, as it will make a splendid white wine.

Lenoir—Poor bearer, as usual.

Lindley (Roger's No. 9)—Suffered from mildew and rot, more than we have ever seen before, but ripened its wood well, and will behave better, we trust, next season, as it has always been healthy before.

Marion—Mildewed and rotted badly.

Mary Ann—Healthy and productive, as usual. Valuable as an early market grape, as it ripens before the Hartford.

Massasoit (Rogers' 3)—Rotted and mildewed some here, on new rich soil. In our former vineyards at Hermann, it did well, was healthy, and is of excellent quality. It will, no doubt, make a very fine wine, and as it ripens with the Delaware is a much larger berry, very productive, and of very fine quality; it would also be an attractive market fruit. Should be generally tried.

Merrimack (Rogers' 19)—Vigorous grower, but showed rot and mildew. It is a very handsome grape and of fine quality, but we think Wilder (Rogers' 4), which is of the same size and color, and of even better quality, preferable to it.

Miles—Has no fruit on yet, although the vines were very strong and in their third year. General characteristics of the vine much like Ives; foliage healthy.

North Carolina Seedling—Some rot, but a very large crop in our former vineyard at Hermann. It can be depended on, with long pruning to tame down its excessive growth.

Othello (Arnold's Hybrid No. 1)—Vigorous grower in this, its first year. Some mildew on foliage, but it seems to have ripened its wood well.

Perkins—Always reliable; a very early grape, productive, and a good market fruit. Most too foxy to suit our taste, but very sweet.

Pauline—This seems to be a failure here, however, fine it may be at the South. Mildewed and rotted badly.

Paxton—The only vine we have of it made a wonderful growth its first season; foliage much like Hartford, healthy.

Rebecca—Badly defoliated, and, we think, belongs to the varieties that "have been."

Rentz—Foliage healthy, vigorous grower, but has not yet fruited with us.

Salem—Did not bear here as yet. At Hermann it rotted and mildewed, and we hardly think it reliable enough in our climate, though of very fine quality.

To-Kalon—So much subject to disease that it is not worth cultivating here.

Union Village—Rotted badly, and is in every respect inferior to Wilder, which is equal to it in size of bunch and berry.

Wilmington—Proved to be a Catawba. Whether there is a distinct variety of that name, we do not know. We have tried it twice, from different parties, and found it Catawba both times.

Walter—We are sorry to say that this variety has utterly failed to warrant its eastern reputation here, the first season of its trial. We were induced to plant liberally of it in the experimental vineyard here, as we were convinced that the originator, Mr. Caywood, was fully satisfied of its merits there, and sold us the vines with the express condition that they were not to cost anything if they did not grow entirely healthy and reliable. The plants arrived in good condition, and were planted carefully, on an excellent piece of ground, well prepared. They started finely, but lost their leaves after the first spell of wet weather, and we fear the most of them will not survive the winter. It is only another illustration of what we have asserted long ago, "that there is no grape, as yet, nor do we think there ever will be one, which can be relied upon in all parts of this country."

Weehawken—This, strange to say, although it shows its foreign origin in every leaf, branch and tendril, has stood the summer remarkably well, with foliage remarkably healthy. We are anxiously waiting its further development. Our vine is only one year old.

Wilder (Rogers' No. 4)—Fine in every respect; fruit ripened well, with little rot, although it lost some of its leaves. This promises to be our most valuable market grape, and does honor to the venerable pomologist whose name it bears.

Rogers' Hybrids yet unnamed—No. 2 has suffered from rot at Hermann. No. 5 has not borne yet, but has healthy foliage. No. 8 was healthy again, and promises to be valuable. No. 12 has rotted

and mildewed considerably. Other numbers are too young yet with us to say much about them.

When we sum up this experience, we find among the varieties which can be depended upon, of black grapes for red wine, the Cynthiana, Norton, Ives, Telegraph, and Concord; of white or light colored grapes for white wine, the Goethe, Martha, and perhaps Maxatawney; these, I think, may now be recommended with safety for *general culture.*

But the general want now seems to be a grape for white wine to take the place of the Catawba, which seems to have been a general failure—a variety which will produce a wine equal to or better than Catawba, without its diseases; uniformly productive, and which can therefore be produced and sold at low rates. Have we found such a grape? I think I can safely answer *yes* to this question, and I think I need only go back on old records to prove that I do not form conclusions hastily, or on evidence too flimsy to be relied upon. I refer those of our old members to the first meeting of this Society, then called the Missouri Pomological Society, at Jefferson City, and to every meeting held since; I will remind them of my predictions that the Catawba was too unreliable, and must, therefore, be discarded. My opinion was scoffed and laughed at *then*, what do they say now? That opinion was not formed hastily, but founded upon experience and observation, and I am not in the habit of recommending any variety for *general cultivation* unless it has been tested and fruited at least four or five years. I happen to have with me the first description of the Goethe, Martha and Maxatawney, which I noted down in 1863, while on a visit to my friend Miller, and after reading it, I will leave you decide how they have fulfilled the expectations I then entertained of them. I have fruited them since 1865 in this State, found them always reliable, have made wine of them repeatedly, and now have no hesitation to recommend them for general culture in this State. I would refer again to the reports on grapes from *all* sections, as contained in last three numbers of the *Grape Culturist*, and which will show clearly how they stand elsewhere.

The past season, though in many respects disastrous to the grape-grower, has also not been without its benefits, and its lessons will be of lasting influence. Such summers teach us, better than anything else, what varieties we can rely upon, and which we should plant, to count upon a sure crop *every* year. It has also convinced us again, that with the large list of grapes at our command, and a judicious selection, there need be no *total* failure, and consequently that the grape crop now is a surer one than that of any other horticultural or agricultural product, where the soil and climate is at all favorable.

The last season has also given me some lessons in pruning, but these may more properly come in at the general discussion on that subject.

E. A. Riehl, Alton: Found the fruit of Rogers' No. 19 retained its

flavor well and kept long. Wilder and Goethe will do well; not having a proper cellar for keeping them, they shriveled. I have seen California fruit much shriveled when it came here, and dipping it in hot water and honey they came out again.

Dr. Hull: Simply dipping in hot water will do well.

H. M. Vories: Is Ives later than the Concord?

Dr. Spalding: Ives colors earlier, but is later in getting ripe.

Mr. Husmann: The Ives has been perhaps undervalued by some, and myself among the number, from the specimens seen from Cincinnati. My own this season pleased me much better, and I think this is generally the case. As a wine, it will take place between the Concord and Norton. Higher than Concord; not so high as Norton. As to its bearing, there is no doubt about it. It does not bear so young.

Dr. Spalding: Cincinnati is about 200 miles north of us, not in fact, but in "thermal lines." It is a very different climate from this, and there is a difference in the wine produced. So it is with varieties. I am glad to hear Mr. Husmann on the Ives. He has just placed it correctly.

The Secretary then read a volunteer essay, by Dr. J. Stayman, Leavenworth, Kansas, on

SOIL AND SITUATION FOR GRAPES.

In successful vineyard culture, much depends upon the soil, location and climate, as may be seen in the quality of wine from different districts and vineyards; but in garden culture we have but little choice to make, for we have to plant vines where our gardens are, or do without them. Although there is a difference in soil, location and climate, yet the grape is adapted to a wider range of country than any other fruit.

We have found it growing wild and bearing profusely on the river bottoms overflown by the high spring and summer freshets; in the ravines and clefts of the rocks, on the gentle slopes, on the hills and mountain ranges variously exposed; in a humid and arid atmosphere; in the forests, climbing the highest trees, and in the groves and thickets, running over the brambles and bushes, and on the border of the open prairie, without any support except the tall grass.

What other fruit can we find growing wild so luxuriantly over such a vast range of country and diversified soil and climate as from Maine to California, and from Canada to the Gulf of Mexico? Indeed, it may be said if any fruit is adapted to general cultivation, it is the grape, seeing its extensive natural range.

Although the grape is adapted to a diversified soil and climate, there is much difference found in the quality of the fruit, depending upon local conditions, therefore we should select the most favorable situations we have. Any soil that will grow wheat will grow grapes, within the range of sufficient heat; but it should, however, be remembered that all locations are not equally adapted to the same varieties, for it requires a certain length of season to mature each variety.

For garden culture, plant on dry, well-drained soil, if you have such, if not, it will pay to drain it. If flat, elevate the ground about one foot high and four feet wide, and plant on the elevation. Select an open exposure towards the east, south or west, if you have such, but if other conditions are favorable, any exposure will produce grapes abundantly.

While we admit garden culture successful in almost any soil or location, it is very different in vineyard culture, either for market or wine; for, if we do not select a good location, we cannot expect to compete with those who do, either in fruit or wine.

A location that will produce good wine may produce good market fruit, but it does not always follow that a location for market will also be equally good for wine, for early maturity. Large size and beauty are more important for market than late maturity and fine quality.

In selecting a situation for market, it is necessary that we are in proximity to a good and permanent market; at such points we have not always good locations, but where there is railroad or water facilities for transportation, fifty or even a hundred miles distant, with a superior location, would be preferable to a nearer market with a medium location.

In planting, particularly for market, we should aim to have a warm situation, that our fruit will mature early, evenly and perfectly, for the earliest good fruit commands the highest price; therefore, a few days in advance will very much enhance the value of our crop. This being a natural advantage will soon pay for the best location, and be a permanent value thereafter.

We should also guard against sudden and excessive changes of temperature, as they subject us to early and late frosts, which may very much injure our crops.

By locating in proximity to large bodies of water, we obviate excessive changes, and are not subject to early or late frosts, therefore our crop is more certain, but if it does not mature so early, is consequently not so valuable for market. But if we select high elevations with east, south or west exposures, in proximity to deep ravines and wide valleys, we both hasten the maturity of our fruit and guard against excessive variations of temperature.

That there are natural advantages in locations may be seen in the early maturity and superior quality of the same variety of fruit at different places.

It is a well established fact that southern slopes of high hills or elevated benches, with a light soil, well drained and clay subsoil, whether the surface is composed of humus, sandy loam or calcareous earth, are the best locations, and if the soil is rich enough to produce good wheat, it is sufficiently rich for grapes, and that lime, marl,

ashes, bone dust and leaf mould are good fertilizers when the land is not rich enough. But very few locations in the West require such applications, and a very large proportion would be materially injured thereby, particularly in Kansas and Missouri.

It may be expected by some that we point out the best situations to produce a good vine, but this subject embraces so many important considerations that we do not feel able to do the subject justice in a short essay like this.

It should be remembered, to make wine successfully and profitably, we should be able to compete not only with our own neighborhood, but also with the best wine districts of this country, as well as Europe.

It may, however, be observed that it requires a specific amount of heat to elaborate and develop a due proportion of sugar in the grape, and that whatever tends to the thorough ripening of our fruit will add to the strength, quality and aroma of our wine. That the best condition are warm soils, sunny hill sides, in a temperate climate, within the zone of sufficient heat and sufficient moisture, particularly from *seeding* time to the maturity of the grape, and one of more importance than the early maturity of our fruit or proximity to market.

It may not be generally understood that the grape requires a mean temperature of fifty-two degrees before it foliates, and a definite amount of heat from thence to maturity; that all the variation in ripening depends upon location and moisture, or in other words, the difference in ripening of the same variety depends upon the amount of heat, light and moisture the grape receives; and that the richness and quality of the fruit depends upon the *concentrated heat and diminished moisture* from the commencement of *seeding to maturity*. That the Concord grape requires from foliation to maturity about 90.00 degrees of heat.

To illustrate these facts, we will give examples of observations made in different seasons and locations.

We have the Concord grape growing on different elevations—one about two hundred feet above the other, on a bluff, On the high elevation, the Concord has ripened from eight to ten days earlier than below.

To ascertain the cause of this difference, we kept a thermometer and observed the difference in the temperature of the two points, and found a daily mean of three degrees, and at sunrise six degrees higher temperature on the bluffs than below. We herewith annex a table of five years observations, in which a careful examination will show a great uniformity in the amount of heat required in ripening the Concord grape at Leavenworth, Kansas:

	FROM FOLIATION TO MATURITY.			FROM SEEDING TO MATURITY.				
Year.	Mean temperature	Numbers of days	Amount of heat.	Number of days.	Mean temperature	Amount of heat.	Time of ripening	Amount of rain.
	degrees.	days.	heat.	days.	degrees.	heat.	August.	Rain.
1868	67.9	133	90.70	45	75.2	34.59	15	21.00
1866	67.2	138	93.19	46	74.7	34.76	20	28.33
1867	67.1	134	90.44	45	76.7	34.53	17	20.34
1868	68.0	133	90.72	45	77.3	34.96	15	18.41
1869	67.5	144	97.34	45	77.2	34.74	25	31.62
On the bluff.								
1868	71.0	127	90.70	43	80.3	34.52	8	15.91
1869	70.5	132	93.55	43	80.2	34.48	15	31.62

From the above table it will be seen that in seasons of the greatest rain, it required a greater amount of heat to mature the grape. Had the rain and sunshine been the same, we have but little doubt the results would have been very nearly alike.

If we examine the temperature from seeding to the maturity of the grape, we find considerable difference, but little in the amount of heat, because at that period there was but little difference in the rain fall and sunshine.

But the most marked difference was in the quality and perfection of the grape, and the strength and aroma of the wine, corresponding exactly with the high temperature of the record at that period.

Many more facts and figures might be given, but time and space will not permit.

H. M. Vories had noticed this point of elevation, and found differences extending to twelve days in favor of high positions.

J. J. Squires had made the same observations on the Joachim river. In the case of Mr. Christian's place, it was seven to ten days; in the case of Mr. Herrald it was six weeks, but Mr. Herrald sold for market; he (Mr. Squires) kept to make wine.

Mr. Vories: This is most important, it sometimes has made a difference of ten to twenty-two cents in the value of the pound of fruit.

Mr. Peabody introduced delegates from the Indiana, Illinois and Kansas Horticultural Societies. The delegates being invited to the platform,

Mr. Lines, of Kansas, spoke cheeringly of the horticultural prospects in his State. He had been in that State fourteen years, and he

had devoted his time partially to horticulture, and he had lived to see the fact settled that Kansas was an excellent fruit growing country. He hoped to see the time when apples would be as plenty as potatoes, and advocated a fruit diet. He thought we should advance to that primitive condition when fruit in the Garden of Eden was the only source of food. He believed the elements in man's nature which tended toward growing fruit and flowers was one which would not die when the man died, but would be a source of enjoyment in the life beyond the grave—be a sort of pleasurable occupation. His theory was that of Dicks in his "Essay on the Immortality of the Soul."

Dr. Spalding: There are a few points brought forward by the essay read that have not been responded to. In regard to the point made by Mr. Vories as to elevation. Perhaps as much is due to the character of the soil as to the mere elevation. It is more than possible that the same points hold in regard to the Iron Mountain districts referred to. It may be quite as much on account of the soil and subsoil as to any other circumstance.

Mr. Husmann: The question of early ripening may be attributed to many causes. Cultivation, soil, elevation, reflection, protection, pruning, all exert an influence. If in pruning you load the vine too much it will take a long time to ripen the fruit.

The President urged the importance of observing these facts in regard to the ripening of the fruit.

W. Sigerson: The influence of the quality of the soil on the ripening of fruit and grain is well understood. A bare knoll in a wheat field will ripen the wheat some days earlier than in the richer soil.

Mr. Day inquired as to the productiveness of the Delaware as compared with the Concord.

Mr. Colman: You can raise five of Concord for one of Delaware.

Isidor Bush: I think the Delaware a very productive variety. It will, perhaps, bear as much to the acre as the Concord. But it does not ripen its fruit well, because of its foliage.

Mr. Colman: I think it will be found that Mr. E. R. Mason grows not only from three to five pounds of Concord to one of Delaware, but ten or twenty pounds to one.

Will it pay to raise Delaware for market here at all?

J. J. Kelley: It can be planted so much closer that it becomes quite productive by the acre, but the difficulty is its maturing the fruit.

Mr. Husmann: Where the Delaware finds congenial soil and other conditions—but these spots are few and far between—it is more productive than the Concord. It is productive to a fault. We have had it produce at the rate of four thousand pounds to the acre; Norton, four thousand pounds; Concord, four thousand pounds. It is not that it is deficient in pounds of fruit that it is not a profitable variety.

The Agricultural College resolutions were then brought up, and after some discussion were referred to a special committee, consisting of Mr. Tice, Dr. Morse, and Mr. Murtfeldt, with instruction to report in the evening.

AFTERNOON SESSION.

The special order being called, Mr. Wm. Porter, of St. Louis, read the following paper on

"HORTICULTURE FOR WOMEN:"

What shall be done with and for the women? There is scarcely a paper or journal in the land that does not devote more or less space to this question. A foreigner might well conclude that the women of this land had become a burden upon the body politic not much longer to be endured.

Various expedients are proposed for placing woman in a more independent position—giving her more and better facilities for self-support. Some would put her into the store or the counting-room. The school-rooms are already largely under her supervision, and very properly so; and many women occupy clerkships of various kinds. But still the cry is for a larger sphere of labor and influence. Some propose a remedy for all the disadvantages to which women are exposed by giving them the right of suffrage, thinking, no doubt, that by the aid of this they will work themselves into a more appropriate and independent position.

I come here to-day not to discuss or express an opinion upon any of these methods, but to suggest that the truest remedy for all the disabilities of which woman has so much reason to complain is that she return to her original status.

When God created man he placed him in a garden to "dress it and to keep it," and enjoy the fruits thereof. He was not burdened with care and toil, and yet he was lonely and longed for some one to share his labor and his pleasure; and so, we are told, God made woman to be a helpmeet for him—i. e., a companion adapted to his nature and condition. She was not to be a companion in consuming the products of the garden merely, but a help in producing them—a help in cultivating the garden.

Thus it appears that they were natural helpers, mutual counsellors, and mutual participators of the fruits of their labor. These relations between man and woman were divinely appointed, and, therefore, conducive to the highest happiness of both.

But these relations have been, and to-day are, extensively disregarded, and the result is in every way disastrous. Let the original

order be restored and the world will again exhibit something of its primitive purity and happiness.

The great object to be gained is to bring woman into a more hearty sympathy and a more full companionship with man in his toils as well as in his recreations.

Horticulture opens a most appropriate field in which to realize such a result.

Under the name of horticulture I mean to embrace all that pertains to the raising of fruit and vegetables, as well as floriculture and landscape gardening.

It may be observed that when the original pair were placed in the garden, the man, who was the stronger of the two, was to perform the severer labor—block out the work as it were—whilst the woman with her more delicate and skillful hands could give the finishing strokes, adding such adornments as her keener perception and more refined taste should dictate, and such as would give beauty and completeness to the whole.

Such, industrially, was the position of woman at her creation, and in this arrangement there was an obvious fitness growing out of the nature of the case. It is affirmed by those who have the best right to be heard on the subject, that there is a constitutional difference between the intellectual and æsthetic endowments of men and those of women, and that these are supplemental, the one to the other, so that in many of the affairs of life completeness is attained only by combining the two.

In speaking now of horticulture for woman, I remark that it is peculiarly adapted to her capacity. The larger part of the work is of a kind requiring only a moderate degree of strength, but a large stock of perseverance. Woman has not the muscular power of man, but we all know that within the limit of her strength she has a power of endurance equaled only by her patience and perseverance. These, added to a love for the occupation, are just the qualities needed in the successful horticulturist.

We may single out any variety of fruit, or we may class them all together, and show that woman has the strength, the skill, and every needed qualification to cultivate them successfully. In the whole process, from the planting of the seed or the cuttings, till the fruit is ready for the table, or for market, the strong and vigorous arm of man will seldom be called into requisition.

And then the labor of drying, canning, or even making wine, can nearly all be performed as well by woman as by man, and, moreover, women, by a little practice, may comprehend as fully and become as skillful in conducting this whole process of fruit raising as men.

So of the vegetable garden. After the ground is prepared for the seed, strength is not so much required to carry on the work as constant care and good judgment, and the whole process, both of

labor and management, is entirely within the sphere of woman's capacity.

It is an interesting fact, in this connection, that in some parts of our country the kitchen garden is almost entirely cultivated by the good housewife and her daughters, thereby supplying the family table with a large amount of healthful diet, and enjoying the satisfaction of having done something useful—a satisfaction not enjoyed by all women, or men either.

But it appears to me that horticulture and landscape gardening presents a particularly appropriate field for woman's labor. In the successful management of these, just those mental qualities and that peculiar tact in doing things are required which are more fully developed in woman than in man.

In matters of taste and in quickness of perception woman excels. She may not possess those powers of invention by which she can devise new forms for the landscape, but she is quick to notice the beauty or defects of any that are spread out before her. As a florist, woman may easily excel, both in the general arrangement and supervision, and in the blending of colors in the parterre, and I will add, in the manual labor required, also.

Go into the green house, the propagating house, or the floral garden, and notice the simple operations there performed by the brawny arms and clumsy hands of slow-moving men, and say if woman with her natural tact in doing things, her quickness of motion and her nimble fingers might not easily become mistress of the situation.

I hope it will not be long before our florists will have an opportunity of testing the comparative capacity of men and women as operatives in their green houses and gardens. A large portion of this work is within doors or under shelter from storms and the sudden changes of weather, and all of it is near home, so that at the worst only a brief exposure to the extremes of weather need occur.

This thought leads me to remark that horticultural labor is eminently healthful.

Setting aside every other consideration, I would, on this account alone, urge women to engage in horticultural pursuits, both as a recreation and as a regular employment.

Many a woman goes to the springs, to the mountains, or perchance to Europe, in quest of health, when she might find it much more speedily and effectually by cultivating a few beds of flowers or vegetables in her own garden.

In nine cases out of ten those whose health is improved in travelling are benefitted, in spite of the travel, purely by exposure to sunlight and by exercise in the open air.

The indoor life, and the sedentary habits of American women are unnatural and in the highest degree destructive to health. Multitudes of them are dragging out a miserable existence in darkness, and as near as possible, in air-tight rooms, when by a few hours mod-

erate exercise daily in the open air they might enjoy robust health and become a blessing to all around them.

Horticulture furnishes both the opportunity and the stimulus for this kind of exercise. Numerous cases might be cited of women whose health was declining, but who turned their attention to the cultivation of flowers in the open air, merely as a recreation, and unexpectedly found themselves speedily recovering.

But I have one other point to make, which is that women may pursue horticulture for a livelihood and as a source of profit.

Probably three-fourths of the labor in the floral garden, including the green house, could be performed as well, and some of it better by women than by men, and of course, the florist could afford to pay them as much as he pays the men and boys now employed.

Let the florist systematize his work so that while the more laborious part of it is allotted to men, the larger but lighter portion shall be given to women if they will avail themselves of and be found competing for it. And let those women who are committing suicide by slow degrees by plying the needle sixteen hours a day, go into the garden and the vineyard, and help to dress and to keep them, as the mother of the race did, and was most happy therein, till she undertook to carry out some plans of her own without first consulting her husband.

The purifying, the refining, the elevating and the moral influences of horticulture, I have not touched, because these are not peculiar to women—being the same to men.

Nor have I dwelt upon the cultivation of plants in the parlor, for this is a mere recreation, and I leave it for more poetic minds to discuss. I have viewed the subject in a practical light in answer to the question with which I started.

Mr. Peabody: I have always taken a great interest in this department of our labors. We do well to consider the subject that is now so well brought before us by Mr. Porter. There are some practical questions that should be solved that it may take *decades* of time to solve, and the employment of female labor is one of them. Horticulture opens up an excellent field for them. We know one estimable woman in the State of New York who manages a large nursery business. She walks through the blocks of trees, sees to everything and conducts the whole business herself. He concluded by calling for the opinion of Dr. Post on this subject.

Dr. Post was in the act of leaving the room to fill a special engagement, and remarked that he concurred entirely with the views taken. He regarded with great favor everything that will extend good, healthy, remunerative employment to women.

He found in the art of horticulture a fine opening for female labor. It would do woman much good in every respect to extend her labor in this direction.

J. H. Tice thought this subject should be fully discussed. Among

flower gardens and in green and propagating houses woman would find a fitting place. Mrs. Blow related to him how, in the sudden and severe freeze in December, 1863, and 1st of January, 1864, that Mrs. Stansberry, all that cold night, attended her green houses, kept up the fires and saved the whole. Her gardener had gone away on a visit, the very mild weather suddenly changed, she found it becoming cold very rapidly, watched the falling thermometer, got up the fires and staid with them during that long cold night that destroyed forest trees, and saved all her plants.

Mr. H. M. Vories agreed with all the former speakers on this subject, insisting that the cultivation of flowers was the peculiar province of females. Instead of being shut up in a close room, eating arsenic to make her skin white, a girl should be out in the garden, getting God's pure breath and winning health and vigor. Mr. V. inveighed against *fashion*, which seemed to taboo people who were devoted to agricultural pursuits.

Mr. Porter spoke of lack of education on agricultural and horticultural matters. Children of both sexes were taught nothing of subjects of such great importance. The rising generation should be taught "plant physiology."

Col. Colman, of the committee on flowers, read the following report:

The committee on flowers and floriculture cannot refrain from expressing a heartfelt acknowledgment of an ever increasing and silently working progress in our midst, of a full realization of that which is *beautiful* in nature. The trees of Paradise are reported by ancient tradition as pleasant to look at, and their fruits good to eat. We know, also, that man liveth not by bread alone, but not less by the gratification of the wants of the mind.

Floriculture, throughout all ages, has stood before mankind with a beautiful garb of fragrant flowers, asking the modest question, "will you accept of them, tend to them kindly, and enjoy them properly?"

We are happy to state that this fairy gift of nature is being very freely accepted in our midst. Horticulture means not fruits and wines alone, but its sound conveys also the idea of that which is beautiful, refining and worthy of the inward soul of man. The reign of the stomach is past, we most sincerely hope, and a better day is coming. To illustrate this sanguine hope let us point you to that pleasant harvest home gathering of St. Louis and Western Horticulture, held under the auspices of your Society in September last, in this city. Remember those beautiful groups and masses of the choicest flowers, side by side with tables loaded with the finest products of the orchard and the vineyard. Without those flowers, and their tasteful effect, what would your exhibition have been, and what would have been thought of it? Ignore that which is beautiful and refining in horticulture, and your honorable society may as well join hands with the

hucksters, and hold their coming exhibition in the hall of the Union Market.

The calling of a professional florist is a laborious and painstaking one, followed in our midst at least, by hardworking, modest men, not given up to a practice in horticultural speech making. With the small amount of encouragement tendered heretofore in your proceedings, to this class of working horticulturists, is it to be wondered at that the sound of the name of the finest flower is seldom heard at your yearly meetings? Is it to be wondered at that your annals are so sadly devoid of any idea of floriculture or ornamental gardening? May we hope that flowers and beautiful grounds may be as lively debated on this floor as wines and apples. And as we see the decrease of the grape, the peach and curculio fever, may we not hope that a society representing the horticultural intelligence of the city of St. Louis and the State of Missouri, will throw out its influence and authority to encourage the cause of floriculture, and the cause of landscape gardening, to help to beautify the thousands of homesteads rising up daily in our suburbs, along our rivers and throughout our State.

Floriculture, as a profession or a trade, is making rapid strides in advance. Every returning spring brings new and increased demand on the florist, and forces him to enlarge his facilities to supply this demand. Our florists are constantly increasing their collections, adding from year to year all the novelties of the day to their lists. Our markets abound in the spring with a variety and perfection of flowering plants not excelled by any city of the land. We have, it is true, no overflowing establishments, and no Vershaffetts and Hendersons in our ranks, but we know also that Rome was not built in a day. Keeping even pace with the growth of our city and our State, our horticultural establishments may some day be large enough.

In no less promising condition do we find, on the other hand, the advance and progress in ornamental gardening; in the beautifying of grounds surrounding the cottage and the mansion.

It cannot be denied that the art of landscape gardening should be better understood in the many attempts made in this direction. A woeful lack of correct and sensible taste is to be seen in but too many instances. Professional landscape gardening has often proved an up hill business in our midst.

No one engaged in this direction has, to the knowledge of your committee, or to that of the oldest inhabitant, made a full competency for his time and labor, yet we see the indication of a better day before us. *Ideas of taste*, long exploded in Europe and the Eastern States, will finally, also, be dropped and forgotten by the people and by the authorities of the city of St. Louis.

In conclusion, your committee begs leave to congratulate the Missouri Horticultural Society on the great and flattering success of the horticultural exhibition held at the Skating Rink, in September last;

and wish to say to the Florists, individually and collectively: *Well done, friends; let us try again.*

M. G. KERN,
NORMAN J. COLMAN,
Committee.

The report of the special committee on select list of ornamental trees and shrubs, reported:

TREES.

Magnolia Acuminata, European Larch (fall transplanting.)

EVERGREENS.

Large.—Norway Spruce, White Pine, Austrian Pine, Scotch Pine.
Small.—Irish Juniper, Siberian, Arbor Vitæ, Savin Juniper.

SHRUBS.

Pyrus Japonica, Wigelia Rosea, Althæa, Almond (Dbl. flowering), Deutzia (Corenata, fl. pl.), Calycanthus, Purple fringe, Persian Lilac, Spirea Billardii, Spirea Prunifolia, Snowball, Deutzia grancilis, Philadelphus, Mock orange.

O. ROOT, JR.,
J. M. JORDAN,
CAREW SANDERS.
Committee.

Adopted as a whole.

REPORT OF COMMITTEE ON FLOWERS ON THE TABLE.

Your committee find on the table, from Messrs. Kern and Michel, a centrepiece, consisting of a rustic pyramid, forming a handsome design, of three baskets or vases of dried flowers, grasses and mosses. The flowers comprising many bright colors of immortelles, some 20 varieties of grass and bright green moss. The whole tastefully and elegantly arranged.

From J. M. Jordan: A beautiful basket of choice natural hot-house flowers, artistically arranged. Flowers consist of a large red Cammelia in the centre, surrounded by Dbl. White Chinese Primrose, Blue Sweet Violets, Heliotropes, Pansies, Bonvardias, etc., Fern, Geranium leaves and Moss. Very elegant design.

From Charles Connon: Two large plants of the Otaheite or Dwarf Orange, in full fruit. The plants were healthy, bushy, handsomely grown, with a dozen or more oranges, ripe, half-ripe on each; very fine plants.

From E. R. Miltenberger: One double white Hyacinth in full bloom; a very handsome plant.

MRS. FRANCIS MINOR,
JOHN HENWOOD,
CAREW SANDERS.
Committee.

REPORT OF COMMITTEE ON WINES.

Mr. President and Gentlemen:

Your committee appointed to examine samples of wine on exhibition, beg leave to report that they have performed that duty, and are glad to congratulate you upon the general good quality of all the wines on exhibition. We find upon the table thirty-three samples, which we have endeavored to grade, as in former years has been the custom of the society, with, in a few instances, some special remark as to quality. In accordance with resolutions adopted yesterday, we grade new wines as such, and not in comparison with older wines. We also feel safe in saying that not one sample of poor wine has been placed before us.

We also wish to say that the quality of all these new wines may change materially before the coming fall, and we are by no means sure that a subsequent examination might not give a different result.

No. 1. Catawba of 1869, from Chas. Paffrath, of Melrose, Mo.; very promising, good flavor and aroma; grade 85.

No. 2. Concord of 1869, from same party; grade 75.

No. 3. Concord of 1869, from same party; very fine and best new Concord on exhibition; grade 85.

No. 4. Concord of 1869, from Cliff Cave Wine Company; very astringent; grade 75.

No. 5. White Concord of 1869, from same party; grade 90.

No. 6. Concord of 1869, from same party; grade 80.

No. 7. Concord of 1869, from same party; very good and promising with age to equal the best; grade 83.

No. 8. Hartford Prolific of 1869, from same party; is excellent for that variety of grape.

No. 9. Rentz of 1869, from same party, is a stranger that we gladly welcome as possessing qualities that please, and if the vine maintains its present good character, will be a great acquisition. As compared with a fine article of Concord, we grade at 85, and think that when made in large quantities it would be even better.

No. 10. Norton of 1869, from same, is very fine, and we grade at 90 as new wine.

No. 11. Catawba of 1867, from J. J. Kelley, is the best of this variety on exhibition, and we grade at 87.

No. 12. White Concord of 1867, from J. J. Kelley, was considered the best of all Concord on exhibition, new or old, and we grade at 87, and would like to meet it often in our daily pilgrimage.

No. 13. Concord of 1868, from J. J. Kelly; very fine, 85.

No. 14. Concord of 1869, from F. Braches, of Gray's Summit; graded 75.

No. 15. Delaware and Catawba mixed of 1869, from F. Braches. We judge to have been left on the husks in fermentation, and the

quality to be thereby improved; at any rate, it can hardly be excelled; grade 90.

No. 16. White Concord of 1869, from F. Braches; pure juice, and similar to No. 5; grade 75.

No. 17. Norton of 1869, from F. Braches; grade 85.

No. 18. Norton's of 1869, from F. Braches; very palatable and sweeter than most samples of this variety; grade 80.

No. 19. Concord of 1868, from H. M. Vories, St. Joseph, Missouri; grade 70.

No. 20. Norton's of 1868, from same; grade 82.

No. 21. Concord of 1867, from G. L. Dietsch, Waterloo, Illinois; grade 75.

No. 22. Clinton of 1868, from E. R. Mason, Webster, Mo.; very good. We think will still improve; grade 80.

No. 23. Norton's of 1868, from same; is best of the Norton's, and grade 92.

No. 24. Hartford Prolific of 1868, from Bluffton Wine Company, like No. 8, is a very fair wine, but we cannot think it a good investment to make wine of this variety of grape when we can do so much better.

No. 25. North Carolina Seedling of 1868, from Bluffton Wine Company, compared with good Catawba grades at 80; is a very nice white wine.

No. 26. Clinton of 1868, from Bluffton Wine Co.; grade 77; will yet be better.

No. 27. Delaware of 1868, from Bluffton Wine Company; grade 85; although so good, is not, we think, quite equal to what No. 15 will be.

No. 28. Norton's of 1868, from Bluffton Wine Co.; grade 80; was probably injured by a musty bottle.

No. 29. Catawba of 1868, from Bluffton Wine Co.; lacks in flavor; grade 77.

No. 30. Catawba of 1868, from J. J. Kelly; grade 82.

No. 31. Concord of 1869, from J. J. Kelly; grade 81.

No. 32. Concord of 1869, from J. J. Squires; grade 78.

In closing this report we ask special attention of the wine-growers to the manufacture of white Concord, which is rapidly growing in favor, and may yet be the white wine of the country.

JOHN M. PEARSON,
S. MILLER,
L. D. MORSE,
E. S. HULL,
Committee.

The Cider Committee submitted the following:

The committee appointed to test the samples of cider on exhibition, respectfully beg leave to report that they have had the same

under consideration, and in their opinion the best sample was exhibited by W. F. Bowen, of Vineland, Mo.; the second best sample was exhibited by Mr. Nanson, of Allenton, Mo.

There were several samples of champagne cider on exhibition, but, as the corks had been started a day or two before, the committee were unable to pass an opinion upon their merits.

The committee beg leave to make favorable notice of a sample of catsup manufactured by John J. Squire & Co., of De Soto, Mo. The committee think it is equal to any manufactured anywhere, and recommend to our citizens the patronage of home manufactures, where articles of equal quality can be obtained.

NORMAN J. COLMAN,
T. W. GUY,
W. S. JEWETT,
Committee.

VEGETABLES.

The committee appointed to report a list of vegetables to be recommended for general cultivation, respectfully submit the following:

Asparagus—(Strictly only one variety.)

Beans (Dwarf)—Early Valentine, Six Weeks Yellow, Refugee, or One Thousand to One.

Beans (Pole)—Large White Lima, Horticultural Cranberry.

Beet—Early Flat Bassano, Early Blood Turnip, Long Blood Red.

Cabbage—Early York, Large York, Premium Flat Dutch, Stone Mason, Red Dutch.

Cauliflower—Early Paris, Erfurt, Large, Early White.

Carrot—Short Horn, Long Orange, White Belgian.

Celery—White Solid, Red Solid.

Corn—Adams' Early, Early Sugar, Stowell's Evergreen.

Cress—Curled.

Cucumber—Early Frame, Early Cluster, Long Green.

Egg Plant—Early Long Purple.

Lettuce—Early Curled Silesia, Early White Cabbage, Large Curled India.

Muskmelon—Jenny Lind, Green Citron, Persian, for South.

Watermelon—Mountain Sweet, Mountain Sprout, Black Spanish.

Okra—Long White.

Onion—Silver Skin, Weathersfield, Yellow Danvers.

Parsnip—Hollow Crown.

Peas—Landreth's Extra Early, Tom Thumb, Champion of England, Blue Imperial.

Potato—Early Rose, Ashleaved Kidney, Peachblow.

Sweet Potato—Nansemond, St. Louis Red.

Radish—Long Scarlet Short Top, Scarlet Turnip, Chinese Rose.

Rhubarb—Victoria.

Salsify.

Spinach.

Squash—White Bush Scollop, Summer Crook Neck Bush; Boston Marrow, Hubbard.

Tomatoes—General Grant, Feejee, Lester's Perfected.

Turnip—White Top Strap Leaf, Red Top Strap Leaf, Skirving's Ruta Baga.

Recommend for trial—Purple Cape Broccoli, Swiss Chard, or Silver Beet.

Giant Wax Bean, American Newington Wonder Bean.

Crimson Cluster Bean.

White Japan Melon, excellent on gravelly or sandy soils.

T. R. ALLEN,
T. W. GUY,
L. D. MORSE.

The report of the committee was adopted as a whole.

Dr. Spalding: Why omit the Early York potato, which is far superior to the Ashleaved Kidney? As to Rhubarb, I think the Linneus is superior to the Victoria.

Mr. Murtfeldt, from Committee on Gallizing, reported:

MR. PRESIDENT: Some years ago, the New York *Tribune* employed a very sharp reporter to look up "*mysterious doings*" in the great city of *Gotham*. This reporter first *did* the fortune tellers and witches. After that the *nostrum* venders were taken to task, and a good many laughable and readable articles were the result.

Among the many who, in so large a city as New York, attracted attention, was a noted and learned chemist, or alchemist, if that is a higher grade, named Lewis Feuchtwanger, who proposed, for a consideration, to instruct people how to put age on wines and brandies. The writer knew the man well, and, by the way, the present firm, L. Feuchtwanger & Son, are still doing business in valuable chemicals, as was evidenced by the fact of their goods (dye-stuffs for cottons and woolens) being placed on exhibition at Cincinnati during the Textile Fabric Exposition last summer.

Well, Mr. President, the reporter above referred to did show, among other things, in a long and labored article, that, for the sum of five dollars, a preparation could be obtained from said chemist that would add, within twenty-four hours, ten years of age to a cask of wine. European wines are said to improve by age. The oldest, being considered the best, brings the most money.

Further, that, for a like sum, a preparation could be had that, in an equally short space of time, would convert a barrel of rectified whisky into the best Cogniac brandy, and so through the whole catalogue of *liqueurs*. But, sir, just what produced such marvelous results was known to Mr. Feuchtwanger only; that was *his secret*. That was a *chemical truth* he did not propose to dispose of.

Very much like the efforts of the New York *Tribune* are those of the Missouri Horticultural Society, in trying to find out to what extent (if any), and how, gallizing is practiced. We know that the generally accepted meaning of the term is: adding sugar and water in a certain ratio to the must or new wine before fermentation; that is all we know. There are, according to intimations of certain gentlemen engaged in the business, "*secrets in the wine cellar*" that no committee need try to fathom. Mr. President, I, for one, have no disposition, either as a committee-man or private individual, to pry into other people's affairs.

It has been asserted by certain Englishmen, that if one should buy a barrel of port wine at Oporto, straddle the barrel and ride it into England through all the custom-houses, it would be found adulterated by the time it arrived there; and I am inclined to believe it.

Let our native wines, like every other commodity, sell upon their merits, and let us not try to instruct people in the process of "*mixing things*," nor attempt to find out the "*secrets of the wine cellar*"

Mr. President, if I may be allowed a suggestion, I hope this society will never appoint another committee like the one of which respondent is an humble member.

On motion of Mr. Peabody, the "gallizing" report was received, and the committee discharged "fovever and ever."

REPORT ON GARDEN PRODUCTS

By A. E. Trabue, chairman, Hannibal, Mo.

Our season the past summer proved uncommonly wet, more so, indeed, than some of our oldest inhabitants have ever observed.

Our truckers are generally located in the bottoms, and many of them were greatly disgusted when they found their days and months of work swept off by the floods of a single night.

Potatoes—The Early Goodrich proves good as an early and late variety; more productive than Neshannock or Peach Blow. Early Rose did first rate wherever tried in this section.

Cabbages—Early York and Early Ox Heart are found best for early, and Flat Dutch for late cabbages. We imported the Champion Ox direct from England, but it did poorly, and proves unsuitable for this climate; has remarkably large leaves, but will not head.

Onions—Do first rate, where well cultivated. The Red Globe, Silver Skin, and Missouri Multiplier answer best for late and early.

Melons—Succeed well here; best on the bottoms.

Squash—Boston Marrow, Hubbard, and other kinds tried here often, but never succeed to any extent; too buggy; even, with the best attention, failure is the rule.

Peas—Early succeed well. Late sown are liable to mildew, and often fail.

Beans—Such kinds as Red Valentine, Horticultural Cranberry, Butter and Lima beans do well if not put in too early in the spring.

Lettuce—Succeed well when properly cultivated. Okra, do.

Tomatoes—The Tilden proves most valuable here, all things considered. The Feejee is larger, but hardly so productive, and not near as sweet or as early. Pear shaped is best for preserves. Key's Early, obtained direct from Hovey, is a patent right humbug all over.

Celery—Does very well with great attention and high cultivation. Dwarf proves best. Both Red and White Solid not so good.

The above selections are based on the experience of the past several seasons, by the most experienced gardeners of this section.

Adjourned.

THURSDAY EVENING.

The meeting being called to order, Mr. Husmann offered the following:

Resolved, That the reading of all essays or papers sent in by absent members be dispensed with, and referred to a committee of three, who shall examine them, and if they think them of sufficient interest, they shall be published with the proceedings of the Society.

Adopted.

THE STRAWBERRY

Was, on motion, taken up.

H. M. Vories, St. Joseph: Have been trying the cultivation of the strawberry. Planted several kinds; Wilson is the standard variety. Agriculturist does well. Have had the best results where I gave a coating of lime in the winter. Soil is very free and too rich.

Samuel Miller, Bluffton: Has tried a number of varieties. Agriculturist was a failure. Jucunda poor. Ida is good, fine quality and flavor, too soft. Downer, fair, fine quality, soft. Peak's Emperor has done well. Colfax is certainly very productive, but that is its only recommendation. Metcalf's early is worthless. I plant three feet apart each way and keep clean. Cultivate all during the season, except when fruiting. Have got one hundred and fifty bushels to the acre. A quart to a stool is considered a small yield.

Wm. Day: I had a patch of five rows, forty-two stools to the row, and these forty-two stools produced one bushel to each row. Wilson's Albany. I market. We have to gather before being quite ripe. For the family I gather eight to twelve hours before using. Has any one tried the Mexican?

Mr. Bowen, Vineland, Mo.: Have tried the Golden Queen, think it equal to Wilson for market, better for table. Green Prolific has done worse than the Jucunda. Agriculturist does not do well. Golden Queen ripens about a week before the Wilson.

Dr. Hull: We have all been telling hard stories of the Jucunda. I paid a visit to Mr. Knox's farm to try to discover the cause of his success with the Jucunda. With his permission I took up a stool about thirteen moths old, and found that it would set eight trusses of

fruit. Took a Wilson; it had thirteen; Longworth Prolific had ten, but this had some runners. I then took up some plants that had the spring runners; one had two trusses, the other, Wilson's, four, and Longworth's Prolific five. This is the key to how Mr. Knox has succeeded with the Jucunda, and if you will adopt the same course, you will succeed as well.

The plant stores up material, and if this material is expended in the production of young plants, it cannot produce so much fruit.

I planted an acre of strawberries, Longworth and Wilson. I cut off every runner of part, and left the others, and they varied from ten to fifteen times the quantity on the runner plants. The Macavoy is one of the best varieties we have, and by this treatment will become one of the most productive. If we put out and cultivate our strawberries the way Mr. Miller says, it may cost twenty dollars extra, that is all, but it makes the returns.

H. M. Vories has planted three feet by fifteen inches.

Dr. Hull: If you plant at too great a distance, the borers may get into the plants and leave them too thin on the ground.

Samuel Miller: A simple plan to cut off the runners is to have two thin iron wheels that are just run along and cut off the runners close to the leaves. You can go over a half acre in a few hours.

PEARS

Were then, on motion, taken up.

Mr. Furnas, Indiana: We have little or no pear blight. We do not grow many pears. In variety the Bartlett is hardy and healthy, but comes in with the peaches. Then comes the Flemish Beauty. I received an account, in a letter, of a tree eight inches thick producing fifty dollars worth of pears a year for several years.

G. Husmann: I have grown pears some fifteen or sixteen years. I had a good deal of pear blight for several years. I tried the *no cultivation, no manuring* plan for several years; the trees have made a good growth of wood, well ripened, early in the season, and after a few years the blight disappeared almost entirely. Would plant upon high ridges, on poor soil. I suppose this acts like root pruning.

Among varieties Bartlett, Seckle, White Doyenne, Beurre Bosc, Napoleon, and a few others do well.

Mr. Miller: This is just about what we want. We want to hear how Dr. Warder and Dr. Hull and Mr. Husmann, and others do, and how they succeed in doing it.

Dr. Furnas: Dr. Warder's pear orchard has blighted badly. I went to see Mr. Shaw's garden; Mr. Gurney, the gardener, was there, I asked him about root pruning. The trees were eight years old. Two years ago he root pruned them. In a tree four to five inches through, he cut off all the roots five feet from it, and there has been no blight. He says he will do the same again in two years.

Dr. Hull gave a long and interesting account of a visit to the Jar-

dis Des Plantes, in Paris. There under the very careful treatment of Mr. Capias, the Donahess was raised double and treble the usual size, and sold easily for five francs a piece, when the same variety could be bought in the Paris markets at five francs a bushel. He referred to the fact of trees producing more buds than the trees could mature, and there was both a waste and an injury. Root pruning prevents this.

The report on the Committee on Fruits on the Table, was then read.

As a general thing we find the fruit in good condition.

From Geo. S. Parks, Parkville, Missouri—Pryor's Red, Ben Davis, Yellow Bellflower, Rawle's Janet, Newton Pippin, Campbellite is White Winter Pearmain, Limbertwig is Nickajack.

New apples of Mr. Parks—Lawver, beautiful, large, dark red, with *flesh-stained red;* think it will prove very fine; Missouri Superior, is striped Pearmain.

Ella Park—A seedling, medium size, dark red, rather tart, fine grained and juicy, a very late. keeper, one specimen fifteen months picked from the tree.

Park—Identical with the Macafee's Nonsuch.

Goodyear—Seedling from Ben Davis, medium size, red, glossy skin, promises well, evidently a long keeper.

From T. R. Allen, Allenton—Rambo, Janeton, Yellow Bellflower, Ortley, Swaar, Rome Beauty, Esopus Spitzenberg, Talman's Sweet, Smith's Cider, Michael H. Pippin, Wagner, generally good, Baldwin, poor. Wanting names—No. 1, Jonathan; No. 2, Westfield Seek-no-further; No. 3, Sweet Romanite.

J. Adams—Seedling, medium, yellowish white flesh, fine grain, juicy, nearly sweet, promising.

From Dr. Dyer and others, Vineland, Missouri—Yellow Bellflower, Newton Pippin, Willow Twig, Rhode Island Greening, Pryor's Red, and Ben Davis' small White Pippin, Northern Spy, Rambo, Winesap, twenty ounce, very fine.

Dr. Edwards, Jefferson county—Winesap, Rome Beauty, Red Romanite, all very fine.

J. M. Jordan, St. Louis—Fall Pippin, Northern Spy, Pryor's Red, Esopus Spitzenberg, Jonathan, King of Tompkins county, Willow Twig, Janeton, Wagner, Peck's Pleasant, Ortley, Rhode Island Greening, Pennock, Smith's Cider, Vandervere Pippin, Talman's Sweet, Harrison, Romanite, Baldwin, Dominie, Ben Davis, Yellow Bellflower.

Some samples were in bad condition from being kept in a wareroom. Also, Orange Quince, and Chinese Mammoth Quince, remarkably large.

From Richard Barron, Franklin county—Janeton, Newton Pippin, Ortley, Baldwin, Long Green, Fallawater, a monstrous specimen, all in good order.

From W. S. Jewett, Jefferson county—Pennock, Janeton, Lady Apple, White Winter Pearmain.

From G. P. Wood, Springdale, Iowa—Grimes' Golden Pippin, small, but a fine specimen.

From A. J. Stewart, Chillicothe, Missouri—Janeton, Winesap, Esopus Spitzenberg, Swaar, Willow Twig, Newton Pippin, Red Canada, Ben Davis, Peck's Pleasant, Roman Stem, White Winter Pearmain, Jonathan, Macafee's Nonsuch, Winter Sweet.

From C. B. Lines, Kansas—Northern Spy, Red Winter Pearmain, Hay's Winter Wine, Winesap, Janeton, all fine specimens, highly colored and free from blemish.

From H. M. Vories, St. Joseph, Missouri—Winesap, Ben Davis, Broadwell Sweet, Newton Pippin, Janeton, Roxbury Russet, Baldwin, Swaar, Northern Spy, Yellow Bellflower, Missouri Pippin, Louden Pippin, Red Canada, all very fine specimens, but little scab or marks of canker.

From Thomas C. Gay, Pisgah, Cooper county, Missouri—Specimen for a name, a fine looking apple, but rather dry.

GEO. HUSMANN,
W. B. LIPSEY,
H. T. MUDD,
REV. JOHN MONTIETH,
W. F. BOWEN.

A short discussion was paid on Macafee's Nonsuch and its numerous synonymes. Adjourned.

FRIDAY MORNING.

The meeting was opened by prayer by the Rev. Dr. Porteus.

The report of Committee on Horticultural Implements, was presented:

REPORT OF COMMITTEE ON HORTICULTURAL IMPLEMENTS.

The Committee on Horticultural Implements report that they find on exhibition three sizes and modifications of *hand lawn mowers*, by Mr. Julius Morisse. Judging from their construction and apparent adaptation to the purposes designed, the committee believe them well worthy of the attention of those who desire well-kept lawns.

We also find on exhibition an implement called the New Jersey cultivator, presented by W. M. Day. This implements consists of a strong frame, with two distinct forms of tools, which may be alternately changed to suit the particular kind of stirring of the soil desired, from the improved harrow tooth to the hoe. All of any one set of the stirring tools, or a single one, or a mixture of both may be

readily applied, either to open a narrow drill, or drills at the same time, or harrow, or hoe the whole surface two feet in width, and may be adjusted to run close to small plants without covering them, and having a rolling wheel in front. The depth may be guaged from one to five inches. This implement we think worthy the attention of both the farmer and horticulturist.

H. CLAGGETT,
Chairman Committee.

Mr. H. M. Vories offered the following:

Resolved, That the next annual meeting be held at St. Joseph.

In doing this he gave the same pledges of support by the Horticultural Society and citizens of St. Joseph given before.

Mr. Jordan thought that a movement should be made in the Legislature to obtain two to three thousand dollars for the purpose of paying the expenses of those committees, etc., that are doing so much to advance the interests of the State in horticulture, and thus induce settlement and aid in bearing taxation.

Mr. Muir thought that the question of co-operation on the part of the several railroad companies would do much toward the success of the next meeting. The short-sighted policy by the North Missouri Railroad did much to prevent the usual attendance at the Columbia meeting.

Mr. Murtfeldt said that the question of loss of time was one of itself an important consideration with most of the members, but when traveling expenses and hotel bills were added, it was felt as too much of a sacrifice for the public good from private individuals. Some two months ago, in Illinois, he had to travel two miles on foot at the end of a long journey, to private entertainment, to be told to go to the hotel.

Dr. Hull thought it was asking too much from any private individual to work for this Society as its interests demanded. There should be a properly qualified individual, a State Horticulturist, paid by the State, to devote his whole time to this work. It would be proper to go to the Legislature for this purpose.

H. M. Vories thought that there would be no fault found after the St. Joseph meeting on the subject of railway travel or entertainment.

After considerable discussion, participated in by Col. Park, Mr. Peabody, and Mr. Kelley, the resolution to meet at St. Joseph was adopted; the time to be fixed by the President and Secretary.

CANNING OR PRESERVING OF FRUITS AND VEGETABLES.

Mr. John J. Squire, of Fruit Dale Vine and Fruit Farm, De Soto, Missouri, read the following:

Mr. President, Members and Friends of the Missouri State Horticultural Society:

In appearing before you by the kind invitation of your President, I do so with considerable diffidence, because I feel that, although I have experimented much and operated very considerably in the preserving of fruits and vegetables, I find much yet to learn—much yet to discover, to meet all of the difficulties that present themselves. The secret conditions and mysterious combinations in the domain of nature, are ever a fruitful field for the scientist, be he geologist, chemist, botanist or naturalist; and no matter how deep the research or how practical the discovery, each research or discovery leads to further mysteries and difficulties, and as these are developed and understood, others again present themselves, and so on *ad infinitum*. While I present my views in this paper as an expert, in the hope of advancing something for the public good, I do not claim to be perfect, nor yet to have fully exhausted the subject.

For the economy of the farm, the orchard, or the vineyard, it is not merely a question of how shall we realize the largest amount of product for the means used, but how shall that product be best expended, or in what manner can we turn it to a practical result? The wealth of the farm, orchard or vineyard does not consist merely in large crops, but in realizing the largest equivalent of means from such crops. Now, such is the nature of the result in the cultivation of the soil, that the problem of taking care of, and turning into wealth, is the one of all others to be solved. As our subject is one that leads to the interest of the orchardist, as the producer, we shall address ourselves more particularly to that branch of agriculture first, and second to the housekeeper, as the consumer, viz: "The Preserving or Canning of Fruits and Vegetables."

The experience of every one engaged in fruit growing, especially in seasons of great abundance, will suggest the importance of some method of taking care of, or preserving for future use or demand that portion of their surplus crop for which they can find no market in the immediate season of maturity; and the housekeeper, as a matter of economy, will realize the importance of being able to store for future use from the bounties of the season those fruits which, in themselves, are from the delicacy of their natures confined to a very brief season. Nor is the importance of this matter simply centered in its economy, but in the gratification it affords to the cultivated taste, and the regaling of the festive board, for it is fast becoming a just and commendable pride with our best housekeepers as to which can excel in this department.

It may not be out of place here briefly to describe some of the various methods heretofore used, and their various merits in relation to success. The great aim in preserving fruits and vegetables is to retain their natural flavor and condition. In this, until quite recently, most, if not all, efforts have failed. The universal idea has

been that sugar or other foreign means are necessary to this end, while the reverse of this is actually the fact. We do not deny that fruits are and may be preserved with the use of sugar, etc., but we do deny that it is necessary. On the other hand, we venture the assertion that, when so preserved, the natural flavor and condition is more or less impaired or destroyed, and, in the light of economy, it is quite objectionable.

To preserve fruit, etc., and retain the natural flavor, various means have been tried, but as yet two only have been successful, and but one thoroughly practical or convenient for domestic practice. Aside from the various recipes for preserving fruits, etc., in sugars, which are more strictly conserves than preserves, we find various attempts to preserve fruits and vegetables by placing them in rooms, cases or vessels, from which all air is exhausted, and for a short time it was thought to be a success. In its outline the fruit seemed perfect, but, on being used, it was discovered that the flavor was entirely gone—a mere pulpy substance, having neither taste nor flavor was the result. Others have placed fruits in cellars or houses so constructed as to exclude all circulation of air, and lowering the temperature so as to preclude decay or decomposition, and by placing in the rooms chemical agents to absorb all moisture, produced by the escape and condensation of the gases, set free by the fruit so conditioned. This has been more successful, but only practical where large quantities are needed, involving large capital in the investment; and even in this, we believe, little or no success has been attained in preserving the more delicate fruits, whose lives, so to speak, are naturally brief and confined to the season of maturity—for instance, the peach, the strawberry, raspberry, etc., the cuticle or epidermis of which is so porous and receptive of oxygen from the atmosphere. Had there been any success in their preservation, it could not have extended beyond the preserving room; for as soon as exposed to a higher temperature, the loss by decay being so rapid, destroys the profit. The question naturally arises, Wherein lays the cause of these failures? This we propose to explain as we proceed.

These methods failing (because in the matter of economy and convenience impracticable), it follows that to be successful other means must be used. The end to be accomplished necessarily required chemical science combined with mechanical application; chemical, in order to expel those elements or properties producing or assisting fermentation or decomposition; mechanical, that when these elements are expelled, to protect from further contact and union. In furtherance of this object, it was found that heating or cooking accomplished the first, and the use of a jar or can the second. The fruit jar or can is, therefore, a necessary article of commercial and domestic economy; and these have been produced of every conceivable construction, and of almost every kind of material, all of which have some merit; many are good in the hands of experts, but

most are deficient in the general requirement of domestic use, in ease and convenience of operation, and in general excellence as perfect fruit preservers.

The tin can, with soldered joint, has perhaps been the most successful, and perhaps more extensively used than any other, on account of the durability of the material and its adaptation to transportation. For domestic use, however, it is very objectionable, because it requires the aid of a tinner to solder up, and the contents cannot be seen to know whether they are good or not; and again, tin imparts a flavor to the fruit which (to some tastes) is objectionable, if not offensive; and especially when fruits are used which contain more or less of oxalic acid, tin is very pernicious, rendering the contents deleterious to health. In view of this, and especially as people generally are not conversant with, or skilled in the chemical analysis of fruit, it is highly important that glass should be used, and these should be free from all metallic or other substances that would either impair the fruit or endanger the safety of the jar.

The jar that is free from these objections, and in all other respects convenient for use, should be selected. A glass jar, to be convenient as well as secure, should have every requirement within itself, and be properly made, of good material and workmanship. The requirements necessary for a convenient and efficient fruit jar are:

1. A jar and cover wholly of glass, and capable of secure sealing by atmospheric pressure.

2. The cover should be secured by some fastening, to provide against any undue action of the contents from improper preparation and cooking, or any lack or insufficiency of the same, and still provide for the safety of the jar.

3. It should be supplied with means of protection against breakage when used in cooking, or transferring from a hot to a cold medium. And last, but not least, easily opened and capable of being used in succession from year to year, without additional expense. Having a jar of this description, all that is necessary is good fruit, a little pure water, and a proper understanding of the nature of the fruit to be preserved, and success is certain.

Having said this much about a proper preserving vessel, I may be pardoned if I here introduce one which is the legitimate offspring of my own experiments, and which fills every requirement cited, which I use in my business to some extent, and would more fully, was it not that its cost debars from an equal competition with others. For domestic use, however, it is unsurpassed, and afforded at the usual rates of other first-class jars.

We now come to the chemical consideration of this subject, or in other words, why is it necessary to *heat or cook* to be successful? This involves, in the first place, that we should look a little into the nature or organic structure of fruits and vegetables generally. I class fruits and vegetables together, not because they are alike in their character-

istics, but because the elementary principles are essentially the same, and these being understood, will apply to all, differing only in the degree of manipulation during the preserving process.

Gray, in his Botany, informs us "that fruits and vegetables in their organic structure are composed of solids and fluids. The solids are composed of an extremely delicate elementary *membrane* of an elementary *fibre* of extreme fineness and of organic mucus. From one or all of these are formed five classes of tissue, well defined in their characteristics: cellular, pitted, woody, vascular and lactiferous tissue." Our object, however, is not to enter into minute botanic definitions, only so far as is necessary to our purpose; hence, we shall only consider the first part, viz: cellular tissues, which is vegetable fabrics; as this embraces all we need to consider in the matter of organic structure.

Cellular tissue may assume a variety of shapes, varying with the circumstances of its connection. Its most common form is that of minute cells taking the form of hexigons when in contact or under pressure; when not in contact or under pressure, that of minute spheroidal bodies. This form of cellular tissue comprises the pith of plants, and the succulent part of fruits, as apples, melons, peaches, etc., and in general all the soft parts of the vegetable structure. In short, cellular tissue is to vegetables what flesh is to animals, and constitutes the basis, physically considered, of the vegetable kingdom. This tissue also assumes every variety of consistence, from a soft, mucilaginous pulp to that of hardened wood, varying much in different vegetables and in different parts of the same vegetables. These changes are produced by a variety of circumstances consistent with the multifarious varieties of the vegetable kingdom. The hardening of the cellular tissue is strikingly illustrated in the gritty cells of the quince and pear, and in the stone of the cherry, the plum and peach. This tissue is in general the depository of all the materials which in vegetables and fruits administer to the sustenance of man, and which afford such gratification to his appetite, and is made up of certain elementary principles or organic constituents. We now come to inquire what these are.

The substance of which vegetable tissue is made is by chemists named cellulose. It is just the same thing in composition of wood and in soft cellular tissue—in the tender pot-herb and the oldest tree. It is composed of carbon, hydrogen and oxygen (twelve parts of the former to ten each of the latter), and sometimes nitrogen. These accordingly are necessary materials of vegetable growth and must be received by the young plant. Vegetable food must contain the three first elements in some shape or other. Let us see from whence they come, and their office in the fabrication of vegetable structure. It is an important fact, also, that these three elements are the base of all decay or decomposition, (which, by-the-by, is growth, only in a new form); hence, there is a close relationship between growth and decay,

between the structure of vegetable fabric and its change to new forms. This is why we allude to the organic *structure* and *constituents* of vegetable fabric to illustrate our subject.

Water is the substance, more than anything else, that goes to production or support of vegetable life. Water is composed of hydrogen, and oxygen 8; and these are two of the three elements of cellulose or vegetable fabric, and are exactly of the same proportions in the one as in the other.

The third element, carbon, is the same as pure charcoal. Charcoal is the carbon of a vegetable left after charring; that is, heating it out of contact with air until the oxygen and hydrogen are driven off. This will explain, in part, why the preserving of fruits in vessels in houses where all air is excluded, proved to be so unsuccessful, and why the outline was comparatively perfect, while the flavor was all exhausted. The charcoal of wood not only makes up the bulk, but preserves perfectly the shape of the cells after charring, but its weight is scarcely one-half of the original. Gray says: "Carbon itself is a solid, and not at all dissolved by water; as such, therefore, it cannot be absorbed into the plant"—only liquids and air can rarify through the cells. Carbon, therefore, must come to the plant in some combination of fluid form. This combination is in the form of carbonic acid. This is a gas, and one of the components of the atmosphere we breathe, but only in a minute proportion, sufficient, however, for the food of plants, but not enough to be injurious to animals; but when mixed with a considerable proportion of the air we breathe is very poisonous. Carbonic acid is composed of carbon combined with oxygen. Carbon and oxygen possess a very powerful affinity for each other, when the temperature is sufficiently raised; but under the usual atmospheric temperature they do not combine. It is produced when charcoal burns in contact with air; also by respiration and by fermentation and decay. In breathing, animals form carbonic acid by uniting carbon from their lungs with the oxygen of the air; they inspire oxygen into the lungs; they breath it out as carbonic acid. So with breathing, animals diminish the oxygen of the air, and increase its carbonic acid. And plants breathe or absorb carbonic acid—taking up the carbon, and returning the oxygen again to the air; hence, we observe in this a perfect round in the economy of nature, wisely arranged by the Infinite Mind, for the sustenance of all organic life. Carbonic acid is also formed by fermentation and decomposition, but only continues so far as in contact with air or oxygen. If oxygen becomes exhausted, and the supply cut off, fermentation or decomposition is arrested, and nature's operations are frustrated. Applying this, then, to our position, the case stands thus: Without water, or hydrogen and oxygen, cellular or plant fabric cannot be fed. Without carbon in the shape of carbonic acid, plant fabric cannot be sustained; and without oxygen, carbonic acid cannot be produced; hence oxygen is the ruling or controlling element

in all organic life. Without oxygen animals cannot breathe; plants cannot grow, and *fermentation and decomposition cannot be maintained.*

Applying these facts to the effect of placing fruit, etc., into conditions where all air is exhausted, and no oxygen other than that in combination with the organic constituents of the fruit itself, it would at first sight be quite reasonable to suppose that all action would be arrested, but this is a mistake. So long as oxygen exists in any excess, or even at all in any position, is is never dormant or inactive, and its office seems to be the ever producing and increasing new forms and new growths. As soon as the fruit or vegetable is matured, its action is in combination with hydrogen, to produce decomposition. Now, in decomposition the temperature is increased, and oxygen then acts upon and combines with the carbon, comprising the bulk or fabric of the fruit. This combination generates carbonic acid, which goes to feed new growths, which, in these conditions, are of the lowest order of plant life, viz: Mold or fungus. This goes on until all the forces are exhausted, and there being no supply of air or oxygen from without, it follows that all action is arrested; but not before the whole constituency is changed.

The flavor which is made up of the acids becomes absorbed in the change, and what is left corresponds to that of charcoal, and would remain so as long as kept in that condition. Hence, "in either case, whether in vacuum or not, with oxygen in the ascendant, change must take place, and be alike detrimental to preservation. Here, then, we have the key to solve the question of how to preserve fruits and vegetables. This does not, however, answer our question, *Why do we heat or cook, to be successful?* But before we can do this, we must further consider other constituents of fruit and vegetables, which are combinations of the above named elementary principles.

In the analysis of fruits, &c., we have that which goes to make up their different characteristics, viz: malic, citric, tartaric, oxalic, and other acids, also sugar and starch; and it is in the consideration of these that we gain the requisite knowledge of manipulation, while in the consideration of the elementary principles we gain the knowledge of control.

As malic acid the principal acid of fruits, &c., we shall content ourselves with its description, and pass on. Malic acid exists in the juices of many fruits alone, but mostly in association with citric, tartaric and oxalic acids, and occasionally combined with potash and lime. We find it in apples, peaches, quinces, sloes, barberries, raspberries, blackberries, strawberries, whortleberries, cherries, ananas, (pine apples,) and the berries of the mountain ash. This acid has no smell, but a sour taste; it deliquesces or melts by absorption of moisture from the air; it is soluble in alcohol, fuses at 150° F.; is decomposed at a heat of 348° F., and affords by distillation a peculiar acid, the pyromalic.

It consists, in 100 parts, of 41.47 carbon, 3.50 hydrogen, and 55.02 oxygen—having nearly the same composition as citric acid.

Starch and sugar are also constituents, elaborated in the vegetable fabric by the foregoing elementary combinations, and are stored up for purposes of future use, to meet the necessary requirements of the animal kingdom, for the elaboration of new forms, and for reproduction.

Starch is an important element of food, alike for animals and vegetables. Leibig says: "Its ready convertibility, without change of composition, into soluble forms, such as dextrine and sugar, adapts it admirably for carrying on the changes which occur in the juices of vegetables." Starch is one of the most abundant constituents of vegetable products. It is found in the seeds of most plants, in roots, and in some fruits before being ripe, as apples and pears, but in the process of ripening it is changed into dextrine and sugar. Starch being that principle in the vegetable structure that holds so important a part in all change, it is an important matter in the consideration and elucidation of our purpose to note its action. In ripe fruits we have very little of it to contend with, and this will account in a measure for the ease with which we can control or preserve them, as compared with vegetables.

With vegetables, however, the case is different. In the process of change from old to new forms, whether in decomposition or fermentation, it is so acted upon by the elements, hydrogen and oxygen, that a peculiar substance named diastase is formed, which possesses the remarkable property of converting the starch into sugar, and it is in proportion to this property of readiness to form sugar that we find the principal difficulty in the preserving of vegetables, particularly corn, peas, &c. When it is changed into sugar, fermentation is at once commenced, and continued until arrested by a suspension or separation of the controlling elements. Diastase has no remarkable action on other vegetable principles; but on starch its action is specific, converting it first into dextrine and afterwards into sugar. Tomlinson says: "The change of starch into dextrine by action of diastase, takes place in gelatinous starch even at the freezing point of water; but the conversion into sugar is most powerful between 150° and 160° F. At the *boiling point of water diastase ceases to act on starch.* So powerful is the action of diastase at proper temperatures, that 1 part is said to be sufficient to saccharify 2000 parts of dry starch, and the larger the proportion of diastase the quicker the change."

Here then we have the answer to the question, "Why we cook or heat to be successful?" At 212° of heat we arrest the action of diastase on starch; at from 150° to 212 we throw off the element oxygen from the organic constituents of fruits, as malic and other acids; and if this be effectually done and the fruit or vegetable, as the case may be, is thoroughly protected from all contact of oxygen after-

wards, no action or fermentation can ever take place, or, as Liebig has it, "its condition is eternal. From this discovery of the properties of heat to emit, or separate oxygen from kindred elements, it becomes an important question as to how this can be best accomplished, and in what manner the heat can be best applied? It is in the proper understanding and application of this that constitutes all the success of packing or preserving fruits or vegetables on a large scale, but, which is understood by a very few.

Boiling water and steam are found to be the only practical and convenient means to produce this result. All fruits and vegetables do not require the same degree of heat alike; nor the same continued application of heat. That degree and continued application of heat necessary for the peach would destroy the entire character of the strawberry; and the degree, and continued application of the heat necessary for corn or peas would be impracticable to the peach. Fruits of delicate texture, such as the strawberry, raspberry, blackberry, gooseberry, currant and some others, should not have heat applied to them quite up to boiling point, but should be retained in the hot water bath sufficiently long to set free all oxygen contained therein. Active or rapid ebullition tends to macerate and soften the cellular tissue or plant fabric without hastening the process. Fruits having their tissue of a more hardened texture, such as stoned fruits, pears and quince, may be brought up to the boiling point, but not so rapidly as to soften or macerate. For vegetables, as corn, peas, beans, &c., the opposite is the case. The boiling should not only be rapid, but continued a long time. Although diastase, as previously stated, is deprived of its power over starch at a heat of 212°, still the cellular tissue in which the starch is stored is of so close a character that a heat of 220° is necessary to digest the mass and free the oxygen.

The domestic practice of cooking fruits in open vessels and transferring them hot to the jars is wrong. The fruit is necessarily overheated, is soft and macerated in appearance, and, withal, adds largely to the labor, while the assurance of success is at the best doubtful. All fruits and vegetables should be well matured and properly prepared, then packed firmly in the jars or vessels they are designed to be preserved in; water should then be added, which assists in the exudation of the juices in proportion to the dryness or juicy character of the fruit or vegetable to be preserved. Experience here is the best guide. After this the cover should be secured to the jar or vessel, *leaving a vent* for the escape of the gases. These then are to be placed in a larger vessel containing cold water and this water brought to the boiling point. For delicate and juicy fruits the ebullition should be very low, the aim being not to start ebullition in the jar or vessel containing the fruit. If the jars be glass, the degree of heat will be fully two degrees below boiling point, and here is another valid reason why glass jars should be used in domestic practice.

For fruits such as apples, pears, quinces, stone fruits and tomatoes,

the ebullition, may be increased, which can be done by covering the larger vessel. For vegetables: as corn, peas, &c., the ebullition should be quite rapid and uniformly maintained during the whole time of cooking, and if the temperature could be raised to two hundred and twenty degrees, or higher, the result would be more certain of success.

To particularize further, we here append a formula for boiling as a guide to general practice.

For strawberries, let the water boil 1½ or 2 minutes, then stand to cool 30 minutes.

For cherries, let the water boil 5 minutes, then stand to cool 30 minutes.

For raspberries, blackberries, whortleberries, currants and gooseberries, let the water boil 6 minutes, then stand to cool 30 minutes.

For peaches, plums, pie plant, apples, pine apples and grapes, let the water boil 10 minutes, then stand to cool 40 minutes.

For quinces, pears and tomatoes, let the water boil 20 minutes, then stand to cool 40 minutes.

For green corn, peas and beans, let the water boil hard 5 or 6 hours, then stand to cool 40 minutes.

The end gained by allowing to cool down is to give time for the oxygen to all escape through the vent. The contents will still be sufficiently hot to thoroughly secure or seal down, so as to produce a vacuum in the vessel. Closing too soon is the fruitful cause of spoiling by fermentation, as fermentation is due to the oxygen being left in the contents, and not always by air gaining access into the jar. Should, however, the solid contents of the jar be above the fluids, any access of air would endanger the contents. Fruits should always be submerged by their fluids, then any access of air would only form mould. Air or oxygen cannot descend through fluids only under pressure, or by capilliary attraction. Should such jars, however, be inverted, the air would ascend through the contents, and fermentation at once be produced; it is, therefore, important that vessels, containing fruits preserved, should not be inverted, where there is any contingency as to the security of the vessel.

The preparation of fruits and vegetables for preserving or canning is a matter of some importance, and should never be done in a wasteful or careless manner, and cleanliness should have paramount attention.

Berries of all kinds should be relieved of all stems and leaves, decayed fruit picked out, and if dirty or gritty, should be washed or rinsed in clean water, then well packed in the vessel as before directed.

Stone fruits, as cherries, plums and peaches, may have their stones removed or not, as desired. Peaches, however, should be scalded to remove the skin, then halved, and the stones removed; and as fast as prepared, dropped in a vessel of clean water. This will

prevent the atmosphere from staining or coloring the fruit. As fast as sufficient are prepared to fill a jar, they should be packed at once, water added, and the jars closed. If allowed to stand too long in water, they become soft and difficult to handle.

Pears, apples, pine apples and quinces should be pared, quartered and the seed cells removed. These should also be kept in water, as directed for peaches.

Tomatoes, scald, remove the skins and cores, pack the jars as full as possible of solid fruit. Tomatoes require no water; in fact they contain too much, and the juices should be poured off and made into catsup.

To scald tomatoes and peaches, take any vessel having holes in the bottom, fill with fruit and dip in boiling water, remove occasionally and try the fruit; if the skin will slip, they are sufficiently scalded. Being retained too long in boiling water, the fruit becomes soft and more or less impaired.

Peas and beans are shelled from the pods, placed in jars or cans, and well packed. The vessel is then nearly filled with water, sealed as directed for fruits, and rapidly boiled as per formula.

String beans are cut in slices, then managed as directed above.

Green corn is cut from the cob, the cob scraped with the back of the knife to secure the milk, then packed as directed for beans, and boiled as per formula.

Sugar not being a necessary adjunct to preserving or canning, we have purposely avoided any remarks thereon in our formula. To govern those who may desire to use it, we here remark that it should be applied as follows: Take water and add sugar so that the saccharometer will show five, ten, fifteen or twenty degrees, as taste may dictate; add the syrup to the fruit in the jars in the place of water, as previously directed. Weak syrups are usually the best, as then the fruit will be more perfect in appearance. Heavy syrups have a tendency to shrink the fruit.

In closing, we would also state that light has a deleterious effect on some fruits, as strawberries and cherries. It does not appear to impair the quality so much, but changes the color, which spoils the appearance. Such fruits should be kept in dark rooms, or, which is better, wrapped in dark colored paper and packed away in a uniform temperature. This last is also important for all fruits and vegetables.

Mr. Jordan: When East paid considerable attention to this question of canning fruit. He watched with much interest all the process, and tried to learn as much as possible. He felt convinced that there were some secrets in the process.

In one establishment he noticed a long box or steam bath that was in use in putting up tomatoes. There are some points in regard to the shrinking of the fruit.

Mr. Squire: Should the vent-hole be left in the can? This is left

open in the preparing of the fruit, and is sealed up when the process is finished.

Mr. John H. Tice presented a long report to the Legislature upon the subject of Agriculture Colleges, which was received.

THE AGRICULTURAL COLLEGE FUND.

Professor John H. Tice, chairman of the committee to whom was referred Mr. Mudd's resolution respecting the Agricultural College grant, reported the following, which, on motion, was ordered received and printed with the official proceedings—the length of the "memorial" rendering its presentation to the Legislature impracticable in the opinion of the Society:

MR. PRESIDENT: The committee to which was referred certain resolutions relating to a proposition, now pending before the State Legislature, respecting the diversion of the Agricultural College fund, to the Common School fund, respectfully beg leave to report the following memorial to the Legislature, as containing the views of this Society, and as a solemn protest against the contemplated proceeding:

To the Honorable the Legislature of the State of Missouri in General Assembly convened:

The memorial of the Missouri State Horticultural Society showeth that it is with extreme pain and regret that the members of this Society have seen that a proposition has been introduced into the State Legislature looking to a diversion of the Congressional land donation for the purpose of aiding in the establishment of an Industrial College in this State, to the Common School fund. The members of this Society view with alarm the aforesaid proposition, as from every point of view they can see nothing in it but disaster to the educational interests of the State if adopted. Certainly there is not even a plausible pretext that it will be of any material benefit to the noble cause of common school education.

The law of Congress provides, and if it did not, the Constitution of the State does, that the proceeds of the sales of the Agricultural College lands shall be invested in United States bonds, bearing five per cent interest. Now supposing that these lands should sell, and nobody pretends that they will sell for less than five hundred thousand dollars, this sum invested in five per cent interest bearing bonds will amount annually to twenty-five thousand dollars. It is known that the children of educable age, as fixed by statute, is about six hundred thousand, so that the amount realized annually, with our present population, will be just four cents per capita of children, and annually decreasing with the increase of population.

To the school fund it is a mite so infinitely small as not to be appreciable. It is not pretended in any quarter that the State Legislature has any power to make this diversion, but that it must obtain

the consent of Congress before it can do so. Now it is well known that these lands were located as near as possible, and some within what is known as the Railroad belt, where the railroad is now being constructed; and it is also known that there are hundreds of persons engaged in chopping wood, and especially railroad ties, upon these lands, thus despoiling them of nearly all their intrinsic value.

Now, an appeal to Congress to ask and obtain the privilege of making the contemplated diversion would necessarily consume a year or more; and then after refusal, as refuse it will, the State will have these lands depreciated from fifty to eighty per cent by the continued spoliations, to start the Agricultural College, or to abandon the project entirely.

The law of Congress is plain and specific: there is no room for misunderstanding its purport either as to its object or conditions. The object of the grant is expressed in the title of the act to be "to establish colleges for the benefit of agriculture and the mechanic arts." The conditions are: "No State shall be entitled to the benefit of this act, unless it shall express its acceptance thereof by its Legislature within two years from the date of this act." The Legislature accepted the grant as early as the year 1863, and is therefore morally and legally bound to the nation to carry out in good faith the trust assumed; or if it chooses not to do so, to let the time elapse as limited in the act, without establishing such a college, when the whole grant will revert to the donor. These are the alternatives presented by the act, and there is no reason to hope any exception will be made for Missouri.

Of all the national grants, none is more munificent and honorable to the grantor, and for a purpose so noble as this, "For the purpose of establishing colleges whose leading object shall be to teach such branches of learning as are related to agriculture and the mechanic arts." It is a grant in conformity to the aspirations of the age, and an outcrop of that spirit of immense progress in science, industry and art, which has made the first half of the nineteenth century illustrious for all time to come. Since the beginning of this century, the working man, for the first time in history, has become a thinking man; and, as a thinking man, has every day become more and more impressed with the conviction of the insufficiency of the ordinary rudimentary education for qualifying men to discharge the diversified duties and and employments of modern life. The beginning of this century saw but three learned professions, now there are thirty; and the toiler so long kept in subordination to other pursuits though the producer of all the material wealth of the nation, demands that all honorable pursuits and employments of life be made learned professions. Three professions, because learned, were alone regarded as honorable; the men that kept society from sinking again into barbarism, the workers, now demand that all professions alike shall be honorable.

Science is the sole foundation of skill and success in every active

employment of life, and skilled trades and professions are the demands of the age. Hence there is a demand for special, that is technical education, and for means to establish technic, or if you will, polytechnic schools. The grant originated from the persistent demands of farmers upon Congress for aid to establish farmer schools. You cannot repress this rising demand; and if you could, you should not. It is the aspiration of men sighing for enlightenment, elevation and refinement. It is one of those irrepressible conflicts, innate to man, which gather strength from every effort at suppression.

> Freedom's battle once begun,
> Bequeathed from bleeding sire to son,
> Though baffled oft, is ever won.

We therefore urge upon you to look at this matter from the standpoint of the thinking and reflecting men of all conditions, pursuits and professions in active life. The number of such is rapidly on the increase, and ere long will be strong enough to enforce their demands. And after considering the right and justice of the measure demanded, and its influence upon the future welfare of the State, to to carry out the letter and spirit of the law of Congress by establishing an Industrial College.

JOHN H. TICE, *Chairman.*

Mr. Murtfeldt thought that, while the paper was clear and exhaustive, it would fail in its object because being too long.

This view was taken by several members, and finally the original resolutions were adopted:

WHEREAS, A proposition has been introduced into our State Legislature, looking to a *diversion* of the agricultural and mechanical grant of Congress from its intended use; and

WHEREAS, For the improvement of our agriculture and horticulture, we need continued and extensive experiments, carefully organized instruction, and wide spread scientific information; therefore,

Resolved, That the State Horticultural Society, in behalf of the horticultural interests of the State, most earnestly protests against any such diversion, and urges upon the legislators to perfect arrangements, at once, for the opening of the college provided for in the Congressional grant.

Col. Colman offered the following additional resolution:

Resolved, That the Secretary of this Society is hereby instructed to send, immediately, a copy of this preamble and resolution to the presiding officers of the Senate and of the House of Representatives, at Jefferson City.

Which was adopted.

The following resolution was handed to the Secretary and read:

WHEREAS, The aims and objects of the society for the prevention of cruelty to animals are of peculiar and direct interest to the agriculturists of Missouri, and all possessed of humane instincts; therefore,

Resolved, That the Missouri State Horticultural Society heartily sympathizes with and will unite in the efforts of the Humane Society

to protect our beasts of burthen, and all other which add to the pleasure or the profit of the human family.

Adopted.

It was, on motion,

Resolved, That the thanks of this Society are hereby warmly expressed to the Iron Mountain and Pacific Railroads, for returning our members; also, to the hotels of St. Louis, who have received our members at reduced rates; to the Press of the city, for the reports of our proceedings they have given from day to day; and especially to the worthy janitor of the "Temple" for his attentions.

Resolved, That the Secretary be allowed $50 for preparing the proceedings of the Society for publication.

The Committee on Canned Fruit report:

One glass jar of Chickasaw plums, in perfect condition.

One glass jar of green field corn, in excellent preservation, its original flavor well preserved. Two years old.

One jar of May Duke cherries, good and well preserved.

One bottle tomatoes, considered most excellent.

One jar of peaches, not quite as well preserved, owing to the inferior quality of the peach itself.

The whole presented by John J. Squire, of DeSoto, Mo.

Adjourned, to meet at St. Joseph, Mo.

[Owing to not receiving the report of the Ad Interim Committee of Southern Missouri, until a late day—after the first portion was printed—it is given below.]

REPORT OF THE AD INTERIM COMMITTEE FOR SOUTHERN MISSOURI.

About the 26th of May last, the chairman of the committee, in company with Dr. Hull, of Alton, visited several fruit farms in the vicinity of Kirkwood and Webster, in St. Louis county. It had been reported that apple trees in these localities were to some extent dying, and the visit was for the purpose of inquiring into the facts, causes, etc.

THE BORER.

Our first visit was to the orchards of E. Morrison, Esq., near Kirkwood. Many of his trees were dead, and many others were in a sickly condition. On examination it was found that the injury was

done by the borer (*Saperda bivittata*). Six to a dozen of them could be found in one tree in some cases. They were actually girdling the trees at the surface of the ground. Dr. Hull had never seen them so plenty. He recommended digging or cutting them out, an application of hot soap, and banking up at least sufficient to completely cover the injured part.

These trees were about ten or twelve years old, and had been much neglected since they were planted. At one time the orchard was sown to wheat and seeded down to grass. Since Mr. Morrison has owned the place, the trees seem to have been well cared for, except that he had not looked for the borers. Many of his peach trees had died, but this was attributed to the roots having been uncovered and left exposed in February, water standing in the excavations. The peach trees were nearly free from borers. It was thought they had been kept away by putting ashes around the trees.

Mr. Morrison is now planting grapes quite extensively, and has a thrifty young vineyard.

The next morning we were joined by Dr. C. W. Spalding. A brief call was made upon Dr. B. F. Edwards, the veteran horticulturist in Kirkwood. Here we found a great variety of fruit in a very flourishing condition. A bed of Agriculturist strawberries, four years old, looked remarkably well and had on an immense crop of fruit. It was remarked that they make but few runners. They nearly accomplish for themselves what is necessary to be done for other varieties, namely, cutting off the runners, in order to make large and productive stools. A patch of Nicanors, and another of Durand, new varieties, looked very promising—blossoms perfect, and plenty of fruit. The Green Prolifics were dying out. Drs. Hull and Spalding averred that it was caused by worm or borer that perforates the roots. Although some old perforations were found, we were not convinced that this was the cause of their dying. Only this variety was thus affected. We saw the same variety in another locality in a similar condition. Dr. Edwards has a portion of his grounds in orchard grass and red clover, and thinks very highly indeed of the orchard grass and the combination.

At Mr. Geo. H. Gill's, some plum trees, loaded with fruit, were examined. The plums were nearly all stung by the curculio, many of them several times, but it was found on examination that but very few of the eggs had hatched. Dr. Hull said this was on account of the recent cold weather. This gives encouragement for a crop of plums.

APPLE-ROOT PLANT-LOUSE.

Our next visit was to the orchard of Wm. Groshon, near Webster, where it was reported the root-rot existed. Upon an examination of the trees it was found that they were badly affected by the Wooly Plant-louse, which had been upon the roots. The lice were almost

totally destroyed now, as it was thought, by the application of ashes to the base of the tree which had been made some time previously. The result of their work was plainly visible on uncovering the roots, in their knotted, clubbed condition, many of them being but a mass of excrescences. These so check the circulation of the sap that the tree finally dies.

In the *American Entomologist*, for January last, is a lengthy article upon this and allied species of plant lice, with illustrations. It is there stated, that "although this insect usually confines itself to the roots of the tree, yet a few may occasionally be found on the suckers that spring up around the butt of the trunk, and even on the trunk and limbs, especially in places where a branch has been formerly amputated, and nature is closing up the old wound by a circle of new bark. Where it works upon the naked trunk it often causes a mass of little granulations to sprout out, about the size of cabbage seeds, thus producing, on a small scale, the same effect that it does upon the roots. Wherever the insect works, small as it is, it may be easily recognized by the peculiar bluish-white cottony matter which it secretes from its body, and which is never met with in the case of the common Apple-tree Plant-louse that inhabits the leaves and the tips of the twigs."

Many, doubtless, have noticed more or less of the knobby, warty roots referred to, on trees obtained from the nurseries for planting, without knowing they were caused by, and perhaps contained, an insect so injurious to the health and even life of the tree. The best plan with such roots would be, probably, to dip them in hot water and ashes before planting. The same article from which we have already quoted says:

The best mode to get rid of the Apple-root Plant-louse is to drench the roots of the infested tree with hot water. But to render this process effectual, the water must be applied in quantities large enough to penetrate to every part of the infested roots. There need be no fear of any injurious result from such an application of hot water; for it is a very general rule that vegetable organisms can, for a short time, stand a much higher temperature than animal organisms, without any injury to their tissues. For example, hot water has been from time immemorial employed to scald the borer in peach trees; and there is good evidence that it will kill the onion-maggot without injuring the young growing onions.

The ashes in Mr. Groshon's orchard, though not applied for that purpose, seems to have proved effectual in destroying the lice. We believe that unleached ashes would in all cases prove quite as effectual, probably, as the hot water, and otherwise benefit the tree by its manurial effect.

Dr. Hull would perhaps recommend hot soap. Salt or gas lime in proper quantities, not too much, would probably prove effectual. We have not been aware of so serious injury from these little insects un-

til within the past two years. Many of Mr. Groshon's fine trees, a dozen or more years old, are beginning to succumb to their influence. By checking wood growth, they induce fruitfulness; the tree overbears, and thus becomes more enfeebled. We have frequently seen quite small trees that were affected by root lice, loaded with fruit. We advise those who have apple orchards, to look for these lice, and if found, adopt measures for their destruction.

JEFFERSON COUNTY.

On the 5th of June, in company with Mr. C. V. Riley, State Entomologist, the chairman visited a few fruit farms in Jefferson county. From Sulphur Springs station we passed through large peach orchards, belonging to Dr. Silas Reed, Mr. T. W. Guy, Rev. Chas. Peabody, and one or two others. These orchards are bearing a good many peaches. The trees of Hale's Early are full; some other varieties have a fair crop; others none. At a subsequent visit, we found that the Hale's Early all rotted. Several of these orchards had been seeded to red clover, producing a fine crop. which had nearly all been cut. We presume this is a very good plan, to seed orchards of peaches or apples in clover, when old enough to bear, and then after the clover is cut we should wish to turn in the hogs to eat up the fruit that falls from the curculio and other like insects.

The opinion seemed to be general among the fruit-growers here, that the curculio was less abundant than a year ago, yet on the ground under the peach trees there was a large quantity of worm eaten fruit.

In the vineyard of President Peabody, we found the grapes unusually large for the season, larger than in other vineyards not far distant. The cause of this is said to be its nearness to the river. Vineyards near the river, we are told, are always earlier, and it is found quite convenient to have one vineyard near the river and another further back, so that the crop of the first may be ripe and disposed of before the other suffers for want of attention.

The farm of Major E. S. Foster, on a bold river bluff, was visited. This was all forest three years ago. On a bold bluff near the river, Mr. F. has erected a very beautiful stone residence, in the favorite style of Downing, and commanding some most magnificent river views. He has ten acres in vineyard, nearly all Concord, now in the third year, and bearing a very good crop of fruit. These vineyards are well grown, neatly cultivated, and very even. The Entomologist found very little in them of interest in the bug line. One pestiferous little striped bug, about one-quarter of an inch in length, was occasionally found in the vineyard, and in large numbers in an adjoining potato patch. It is called *Capsus lineata.* Its bite or sting is said to be poisonous to vegetation, and the tops of the potatoes were considerably withered from its effects. As the little rascal flies readily, no remedy was suggested except the application of a solution of cresylic soap or something of that sort.

A row of grapes was pointed out to us in the vineyard which showed a much more vigorous growth and deeper color than the others. This row had been planted over a gully which had been washed out down the slope to the depth of several feet, and filled up with stumps, roots, old logs, etc., and covered over with earth. Mr. F. said he thought the grapes would not grow there when he planted them, and was surprised to find that they had outstripped the others adjoining. This seems to show that underdraining would be quite useful.

BOONVILLE.

About the middle of June, a visit was made to Boonville, which has a reputation for producing excellent wine.

The soil in this vicinity is of a superior character. It is of the bluff formation, what is called loess, much resembling that at Alton, Illinois, varying in depth from 30 to 100 feet. It is well adapted to grape culture and to other fruits. We saw at one place several trees of sweet cherries, among them the Black Tartarian, of good size, healthy growth, and bearing full.

THE VINEYARDS.

In the vicinity of Boonville there are about 100 acres of vineyards. Mr. R. D. Perry claims to be the father of grape culture here, He says that about the year 1845 Mr. G. K. Budd and Rev. Dr. Bullard, of St. Louis, were in attendance at a Presbyterian Synod at Boonville. While at the house of Mr. P., these gentlemen recommended him to plant grapes, as the soil seemed well adapted for them. Both offered to send cuttings. Mr. Budd had the Isabella and Dr. Bullard the Catawba. The latter maintained that his was the proper variety to plant, and sent Mr. P. cuttings which he planted at the end of his house. They grew finely, and Mr. Haas, a German, was employed to prune them. Mr. H. became enchanted with the Catawba, and obtained cuttings of Mr. Perry, with which he planted a vineyard; and this led to the formation of the Boonville Wine Company, which is still pursuing the business of grape growing and wine making. It is doubtful whether, without the appreciative taste of the German, the Catawba would have attracted the immediate attention that it did, and perhaps Mr. Haas is entitled to quite as much credit for the early establishment of grape culture here as Mr. Perry.

In company with Capt. Stephens, Judge Keil, Mr. Harley and Mr. Perry, we visited the vineyard and wine cellar of the Boonville Wine Company. The vineyards are mostly on an eastern slope, much of it rather steep and terraced, with two to five rows on each terrace. The walls of the terraces are blue grass sod. The vines are planted 5 by 6 feet, and trained to trellises of stakes aud slats. The cultivation is clean, the vines healthy and bearing a good crop. They have 20 acres in grapes, 18 of which are bearing. The Catawba is the chief variety cultivated, though of late some other varieties have been

planted. The Norton's Virginia is thought highly of. Only two men are at present employed. A week ago they had about ten women engaged in tying up vines.

The wine cellar is of dressed stone, neatly arched, 75 feet long, with four ventilators starting from the floor. Over it is the press room, and rooms occupied by the employees. One of Miller & Moore's Kentucky cider mills is used for crushing the grapes, and they are pressed in a vat by a large iron screw. An extension of the cellar is contemplated by building on to the front.

In the cellar we tasted Catawba of 1866—rather high colored—more acid than usual at Hermann—really good; Catawba of 1867, paler, slightly smoother; Catawba of 1868, not quite clear, but of best quality. We were assured by Judge Keil that these wines were absolutely pure juice, and we found not the slightest room for doubting it. Said Judge K.: "these wines are not sour," and probably they are not, as most people would understand the term; and yet the Catawba contains a good deal of acid, and these wines contain the acid of the grapes unchanged and in its purity. There is not the slightest vinegar sour, which shows that the wines have been well made and well handled. Catawba more agreeable to the popular taste may be made by gallizing, but we doubt whether it could be made more wholesome or really better.

We next visited the vineyard owned by R. D. Perry, and under the management of a German tenant, whose name we did not learn. We found here a greater number of varieties, more largely cultivated and in a remarkably flourishing condition. In the wine cellar, we found very excellent Catawba, Delaware, Concord and Norton's Virginia. The latter very valuable variety, we thought exceedingly fine.

The condition of the two vineyards we have mentioned, and the good character of the wines, show very well the excellence of the locality for grape-growing. Many of the grape growers here adhere with great tenacity to their first love, the Catawba, notwithstanding its frequent failure from rot. We do not deny that the Catawba merits their affection; but when we hear a man say that Delaware wine is not at all equal to Catawba, we cannot help thinking that he is either too much prejudiced, or that his education in regard to American wines has been slightly neglected. And here we wish to say, in all kindness, that we think the grape-growers of Boonville have not been sufficiently wide awake to their interests. They have kept themselves too isolated. We have seldom, if ever, seen them or their wines at the meetings of the State Horticultural Society, or of the Mississippi Valley Grape Growers' Association. Hence we suspect many of them are not as well informed in regard to what others are doing in the same line as they might be, and we are confident that the merits of their wines, and of their locality for grape-growing, are not as well known as they deserve to be.

With a little more enterprise, grape-growing at Boonville might

to-day have been of double the importance that it now is, and grape-growers would have met with better sales and better profits. For the best success in any business, a man must not only take the papers, but he must associate, to some extent, with others in the same business, if he would be well posted. If our inferences are erroneous, we shall be glad to be informed of it, for our suggestions are made with utmost friendly feelings.

VINE GROVE PLACE.

On the 20th of July, the chairman visited the residence of Dr. H. Claggett, near St. Louis, and noted the following:

THE VINEYARD.

This was planted three years ago last spring, being now in the fourth year. Here we saw a well digested system well carried out; and if systems are to be judged by the results, this certainly claims attention. Everything has been done in accordance with a preconceived plan or end, and the end has been admirably accomplished Therefore, a brief account of the principles and practice here adopted may interest our readers.

The varieties are chiefly Concord, a few Hartford Prolifics, Delawares and Taylor's Bullitt—planted 8 by 8, and trained upon trellis of posts and wire, nearly on the Thomery plan. The posts are eight feet long, set two and one-half feet in the ground, one in every second space, except at the end of the rows, where a post is set in the first space for the purpose of extending a brace from its foot to the top of the first post, which is set three feet outside of the first vine. Upon these posts are stretched four wires, the first twenty inches from the ground, the next twelve inches above, and the others at distances of seventeen inches. Two arms from each vine are trained in different directions upon the lower wire. From these upright canes are grown to the top of the trellis, every alternate one being allowed to bear.

The proprietor holds that the roots and leaves are the chief working organs of the vine, and that the art of grape culture consists in surrounding these organs with the conditions best adapted to the perfect performance of their functions. The ground being kept clean and mellow, and slightly ridged at the rows, the roots are well cared for.

As to the leaves, the object is to develop the largest amount of leaf-surface that can be freely exposed to air and light, especially on the bearing portion of the vine. As the object can be best accomplished on the bearing portion by a few large leaves, rather than many small ones, the canes are pinched off at one leaf beyond the last bunch, in order to develop large leaves. The other canes which grow above the top of the trellis are pinched off before the attain sufficient length to hang down and shade the leaves of the bearing por-

tion, and thus injure them. This pinching is done when the vines have grown to about the distance of two feet beyond the top of the trellis, and has the effect to mature and strengthen this part of the vine, develop side shoots and a mass of leaves, three or four feet in width, along the top of the trellis, the office of these leaves being to store up material for next year's crop. There seems to have been, however, a previous pinching off of the canes for next year's fruiting at about the sixth or seventh leaf, or just above the third wire.

We found the Delawares bearing a large crop of handsome bunches, healthy in fruit and foliage, except that the leaves of one vine were covered with galls.

Hartford Prolific, a full crop, and healthy; bunches quite large, and more than usually compact.

Taylor's Bullitt, as vigorous as usual, with but very little fruit.

Concords bearing abundantly.

Dr. C. says the crop is not as large as it would have been, but for the fact that some of the canes that are bearing this year are those that bore last year, and that the hail storm, early in the season, knocked off some of the buds or young shoots. We think, however, the crop is large enough, and there is more than enough good bearing wood for next year. There is no rot worth mentioning.

ASPARAGUS.

Dr. Claggett has a reputation for growing fine asparagus, and we saw here his original patch of one-third of an acre, which, he says, yields over $300 a year, gross. There is upon it now a very dense and heavy mass of green foliage, which is storing up and manufacturing (so says the Doctor) material for the roots for next year's growth. In the fall this immense mass, having performed its office, becomes very light and dry, and may then be cut down and burned. We noticed that the stalks were not bearing seeds, except rarely a few, and asked the reason. The Doctor says that is a part of his plan. He does not set out his plants until they are two years old, when he is able to tell the male from the female plants. He discards those which bear seed, and selects those which do not, so that the forces of the plants may not be needlessly expended in producing seed.

CULTIVATION.

We noticed that many of the Doctor's crops were quite cleanly cultivated, considering the unusually wet season. He says he can cultivate any hoed crop once a week more cheaply than he can once in three weeks, and the advantage to the crop is double. Many will say they do not have time to give frequent cultivation. Then only so much should be planted as there is time to cultivate well, as it will give more profit than the larger quantity half cultivated. We think this is sound doctrine, not put in practice by more than one-third of our farmers.

FRUIT GROWING IN JEFFERSON COUNTY, MO.—VISIT OF THE AD INTERIM COMMITTEE.

Within the past half dozen years Jefferson county, especially that portion of it through which the Iron Mountain Railroad passes, has become noted as a superior fruit growing region, a large number of farmers having engaged extensively in the business, and produced fruits of remarkably fine character. At the American Pomological Convention, held in this city two years ago, the peaches from Jefferson county attracted a marked degree of attention, on account of their remarkable size and handsome appearance. Peaches from the same region took the first premium at the St. Louis Fair last fall.

Five or six years ago the chief products sent to market from that county, aside from minerals, were hoop-poles, cord-wood and charcoal. Now, at every station from Kimswick to Vineland, large quantities of fruit are shipped daily, amounting in the one item of grapes just now from 2,000 to 3,000 boxes a day, and the business is rapidly increasing.

On the 23d instant the *ad interim* Committee of the State Horticultural Society for Southern Missouri, consisting of Dr. L. D. Morse, C. W. Murtfeldt, and Isidor Bush, accompanied by Dr. E. S. Hull, of Alton, and Mr. J. W. Cochrane, of Chicago, started on a tour of observation among the fruit growers of Jefferson county, making the first stop at Glenwood station. For several miles along the river and railroad in this vicinity are to be seen many very beautiful residences, situated on high ridges or bold bluffs, commanding magnificent views of the broad river.

FARM OF REV. CHAS. PEABODY.

The farm immediately at Glenwood belongs to Mr. Peabody, President of the State Horticultural Society, and this was the first place visited. It embraces over a hundred acres, and the owner has harvested large crops of oats, hay, etc., in addition to his fruit crops. His vineyard consists of one acre in the fourth year. His mode of training is different from that usually practiced in this vicinity. The vines are planted six by eight feet. A stake is set in each space, and on the stake is nailed a slat about eighteen inches above the ground. Along the top of the stakes, or about six feet from the gronnd, is stretched a strong No. 10 wire. Small galvanized wires, No. 18, are then attached perpendicularly to the slats and large wire, at about ten inches apart. Mr. P. stated that this mode of making trellis is not more expensive than the ordinary mode of making post and four wire trellis, and has the advantage that the vines will readily cling to the wires by the tendrils, and thus save tying.

The vineyard is yielding a good crop, though it has suffered to some extent this year from rot, perhaps to the extent of one-eighth. The Ionas have nearly all rotted, and the foliage is too defective to ripen what fruit remains. Israella badly rotted—two-third gone.

Creveling, one-half rotted—foliage good, and fruit excellent. It is a wonder that the superior quality of this grape, which ripens early, has not been more generally recognized. Hartford Prolific, no rot; Union Village, winter killed. Delaware is losing its foliage so badly that it will scarcely ripen the large crop of green fruit which it has on. Last year both Delaware and Iona produced well in this vineyard. Concord, which constitutes about two-thirds of the vineyard, is yielding a good crop, though it has rotted to some extent. Bunches were ripest, and had been most affected with rot nearest the ground. There was most rot also along the edge of the vineyard next to the forest, indicating that a free circulation of air is an advantage.

Mr. Peabody has a fine young orchard of pears, peaches and apples, tolerably healthy, and commencing to bear. The apple trees showed that they had been badly infested with borers, as the marks of the knife, where they had been hunted out, are to be seen in almost every tree.

FARM OF T. W. GUY.

Adjoining Mr. Peabody's on the north is the farm of Mr. Guy, who has a large peach orchard, most of it in very flourishing condition, and yielding a good deal of very fine fruit. There were some long rows of peach trees, of the Hale's Early variety, full of rotted and dried-up fruit. Mr. Guy, Mr. Peabody, and other peach growers in this vicinity are quite discouraged with this variety, and propose to dig it up and abandon it on account of its tendency to rot. It has shown this tendency every year, and this year, although the trees were loaded with fruit, much more so than most other varieties; it rotted so badly that scarcely any sound fruit could be marketed.

The Alton large nutmeg melon has been grown this season by Mr. Peabody and many other fruit growers in this vicinity. Most of them condemn it, some of them in unqualified terms. They say it is a mixture of several varieties of melon, with a touch of squash. The flesh of some of them is yellow, some green, and some neither. We did not meet with any specimens in a condition to test, and therefore only give such opinions as we heard expressed.

Night came upon us before we had time to see much of Mr. Guy's farm. The party, however, partook of a sumptuous supper at his house, the table being loaded with luscious grapes, peaches, etc. Most of the visitors spent the night at Mr. Peabody's, and next morning, Tuesday the 24th, visited the

FARM OF DR. BOWMAN.

Here we found a large peach orchard bearing considerable fruit, but a good deal affected by rot. Dr. Hull thinks the peaches would not rot if they were not stung by the curculio. Others are doubtful upon this point. Dr. Bowman's Delawares are very good, losing foliage to some extent, but will ripen the fruit. In fact most of it was already in good eating condition. A few Concords above the house

had rotted to the extent of one-half. Below the house, on open ground, sloping towards the river, is a vineyard of two acres, mostly Concords, and only about one-eighth had been lost by rot. There is a good crop left, which the owner was gathering and sending to market daily. There were some tall weeds in this vineyard, for which Dr. B. is presumed not to be responsible, as he had quite recently purchased the place and moved there from the city. Occasionally a vine was found with its leaves dried up and dead, the work of the grape-root borer, a large white grub which bores through the roots ten to twenty inches below the surface of the ground. Grape growers should be on the watch for this enemy and exterminate it, for if it is allowed to increase it will do serious damage. It is most common in new ground.

A patch of Norton's Virginia in the lower part of the vineyard is doing well, with little or no rot.

The apple orchard is bearing well, and the trees look thrifty.

BUSHBERG.

Our next visit was made at Bushberg, a mile below Glenwood. The propagating houses of Messrs. Isidor Bush & Son, though not very extensive, are perhaps the best built and most complete that can be found in the State. At this season but few vines can be found in them—they have all been planted out in the adjoining ground and have made a fine growth. The houses are now used for forcing strawberries, the fruit of which the owners expect to bring into St. Louis about New Years. This we understand to be rather an experiment in this region, and it will be an interesting one. We doubt whether strawberries can be forced and brought into market in January with good success, but think they may be brought forward in March or April with better success. The Triomphe de Gand and Golden Queen are the varieties adopted for the purpose.

We then went to their pear orchard No. 1, containing about 500 standard and 1,000 dwarf trees, the standard placed twenty feet apart, and the dwarfs intermediate, embracing 80 varieties. It was planted four years ago, and bears its first crop this year. The ground had been cultivated during the first three years in root crops and is now in clover. The trees look all very thrifty; no blight; about 18 trees however had been destroyed by the Gigantic Root Borer (*Prionus laticollis*). About 200 "*Duchesse*" are loaded down with their magnificent fruit. The Bartlett, Belle Lucrative, Howell, Beurre Bosc, Flemish Beauty, Louise Bonne, as fine as we ever saw them. We were also shown some very fine specimens of Beurre Hardy and other varieties less known. The Belle Williams cracked badly.

Adjoining this very pretty pear orchard, on the eastern slope, is their vineyard No. 2, about four acres. The Delaware hangs too full with fruit, which cannot ripen on account of the loss of foliage. The Concords on the contrary have a dense mass of healthy foliage, but

one-half of the fruit rotted. The Hartford had been all picked—gave a good crop.

The Taylor Bullitt, four years old, has borne as yet scarcely any fruit. Herbemont and Cunningham look fine and promising. Nortons did not rot, but having been layered, yields but a small crop of fruit.

Vineyard No. 1, of Messrs. Bush & Son, is on another ridge. In it we found the Goethe (Rogers' No. 1) and Rulander thriving beautifully, their fruit clusters being handsome and free from rot. The Delawares also carried their foliage here much better, while the Concords rotted worse than in their Vineyard No. 2. The Clinton was covered with the gall, so much so that Dr. Hull advised cutting them down. This vineyard fronts the Mississippi river, is protected by a still higher hill on the north; the soil is excellent, mellow, sandy, not too rich, and here Mr. Bush made an experiment with a few hundred European vines, of many different varieties, but only to confirm the well established fact that the *vitis vinifera* will not succeed here in open air; after growing luxuriantly for two years they became sick during the third, mildewed, lost their foliage, the fruit rotted, and Mr. Bush never intends to try them again, nor does he advise others to try them. West of the vineyard we saw about three acres in grape cuttings, perfectly matting the ground with their luxuriant foliage. Their principal propagating grounds, however, with hundreds of thousands of Concords and Ives are on the opposite island, where the Pacific railroad lately gathered thousands of visitors. The European orchard contains several hundred pear, plum and cherry trees, mostly imported from Vienna, Austria. They succeed better than the vines, but not as well as their peach orchard No. 1, and none are yet in fruit. Between the rows of fruit all varieties of small fruit are planted.

Our time did not permit us to examine the cultivated grounds and various improvements which Messrs. Bush & Son have made. But we have seen enough to recognize a judicious system and indefatigable zeal. Mr. Bush intends to sell his surplus land and apply the proceeds in the improvement of Bushberg, which may then become one of the finest and most interesting fruit gardens in the State.

Adjoining the fruit farm of Messrs. Bush & Son on the south, is that of Major E. S. Foster. The place is new, consisting of 80 acres, with about half the amount in cultivation. On a bluff which seems almost to jut out into the river, the Major has erected the neatest and most tasteful residence that we know of in the State. It is built of magnesian limestone, obtained in the immediate vicinity, of an agreeable drab color. It is in the pointed Gothic style, after Downing, and of which many examples may be seen along the banks of the Hudson river above New York. The dwelling is surrounded with forest trees, through which openings have been cut, affording grand vistas up and down the river. This is a good example of what may be done in the

way of creating elegant residences along these beautiful river bluffs, and the time is not far distant when every desirable point in this locality will be similarly occupied.

Major Foster has ten acres in vineyard, bearing the first crop, which is a moderate one. Owing to the extreme heat of the day, lack of time, and the Major's absence, we saw but little of this large vineyard. The portion which we saw, and which we were told was the worst part, had suffered to the extent of a quarter or a third loss from rot. The vines are trained upon stakes, two to each vine, which are insufficient to sustain the mass of canes and foliage which has been permitted to grow. Pinching, at the proper time to prevent excessive growth and overhanging foliage which is generally prejudicial to the fruit, has been neglected. The fruit, however, looks very well, and the yield—not a bad one for the third year—will probably amount to $2,000, even at the present low prices. A few Delawares here were doing very well.

After returning to the house of Mr. Bush and partaking of refreshments, good cold water, Herbemont and Norton's Virginia wines, fine pears, etc., the party was taken in charge by Mr. W. S. Jewett, who conveyed us to Platin Rock by boat. About a quarter of a mile from the landing, on the bluff, in the midst of a large orchard of peaches and apples, is the home of Mr. Jewett, where we found a most excellent dinner in waiting; and never was dinner better enjoyed. The heat was excessive, and we had taken during the morning a long walk, considerably exhausting our energies. For a No. 1, good and wholesome dinner, commend us to the kind offices of the thrifty farmer's wife. French cooks may do for fancy dinners for city folks. A better dinner than Mrs. Jewett gave us could not be desired.

Mr. Jewett's orchard consists of about 100 acres, chiefly peaches. Nearly all appeared to be in quite a thriving condition, bearing only moderately. Dr. Hull, who is always on the lookout for breakers, thought he discovered in one tree something like incipient yellows. We advise Mr. Jewett to watch that tree.

Mr. J. did not seem willing to appropriate a very large portion of our time to his orchard, for he had us driven through in wagons rather hastily, making a visit to a remarkable pond or small lake, situated a hundred or more feet above the river, with clear water, and an abundance of water lilies with leaves a foot and a half or more in diameter, and large white flowers four of five inches broad.

After a drive of a few miles over a rough country, we called at Mr. B. F. Smith's, who is rather a new settler here from the fruit regions of Southern Illionois. He has several acres in vineyard, mostly Concord's and Hartford's. The former in the third year, trained on stakes, bearing a good crop, bunches large and fine, only a trifle of rot. Hartford's nearly gone. He has a very fine young patch of strawberries of three acres, in good condition; also a very thrifty

young peach orchard, which Dr. Hull told would make a poor man of him. As we understood the trees were mostly Hale's Early, we think they will not make him rich unless that variety quits its habit of rotting.

THE FARM OF COL. COLMAN.

Col. N. J. Colman has a farm in this vicinity of about 500 acres. It is said he has expended $40,000 on this place. He keeps here most of his fine trotting and racing stock, chiefly the young animals—it was said $20,000 to $30,000 worth. Portions of his land are leased to fruit growers, and other portions under the care of competent men employed. He has an interest in 100 acres or more of peach orchard, has thrifty young apple orchard of 600 trees, a pear orchard of 500 trees, 1,000 cherry trees, nearly all Early May, and 500 plum trees, chiefly Chickasaw, Damson and Lombard. There is some 30 or 40 acres in vineyard, a large portion of which is under the care of Mr. Geo. Long, who feels a pride in his clean culture and splendid crop. The vineyards are thus far trained upon stakes—varieties, Concord, Hartford and Norton's chiefly. This is the first year of bearing, there is no rot of any consequence, and a very fine crop.

We had not time to see much of this farm. It would be interesting to the public, and probably to the owner, to know whether it is beginning to pay, or what the prospects are that it will pay. Perhaps some figures may be obtained at the end of this season.

Our next visit was to, probably the

LARGEST PEAR ORCHARD IN THE STATE.

It is owned at present, as we were informed, by A. S. Burrill, and contains 10,000 trees. The cultivation has apparently been quite neglected this season, and the weeds are high. There is a good deal of very fine fruit upon it, and some blight was seen, but not yet very serious. There are large peach orchards adjoining the pears, bearing very well. We did not see the owner, and could not gather any important facts, but could see no reason why, with thorough management, these orchards should not pay.

Having an appointment at Victoria for the evening, we had to push forward to meet the down train at Bailey's Station.

BANQUET AND DISCUSSION AT VICTORIA.

Word had been sent to this place that the Committee would like to meet the horticulturists of the vicinity in the evening for discussions upon the subject matter in hand. After supper, the party of visitors was conducted to the school building, which, to our surprise, we found filled with ladies and gentlemen, the former evidently predominating. There was a long table across the room, completely covered with fine specimens of fruit, bouquets of flowers, frosted cakes and bottles of native wine.

The President of the County Horticultural Society soon called

the meeting to order, and a very neat address of welcome was made by Mr. Whitney. Two young ladies, Misses Benson, then favored the company with a song, accompanied by a parlor organ.

The Chairman of the Committee then responded briefly to the address of welcome, expressing his surprise at the splendid horticulture entertainment and cordial welcome with which we were greeted.

Addresses were made by Mr. Peabody, Dr. Hull, Mr. Cochrane, Mr. Murtfeldt and others.

Mr. Cochrane, of Cook county, Illinois, said: "As a delegate from the State of Illinois, I will say that in my locality we have had a very bad season for fruit growers on account of excessive rains. I have come down here to see how you do things. You have at least taught me one thing, and that is that you have learned to combine the beautiful, the useful and the refined. We have here the old and the young, ladies and children, music, splendid fruits and beautiful flowers. I am glad to be with you and make your acquaintance.

Dr. Hull gave a short lecture on the structure and growth of plants, with illustrations on the black board.

The condition of fruit culture in the locality having been asked for, Mr. Walker said the Catawba was a perfect wreck; Norton's Virginia and Herbemont sound and healthy; Delaware had lost its foliage badly; Taylor pretty good; Ives perfect. Everything this season had grown too fast—run wild. Concord had rotted some, but was generally good, bunches fine—they were not discouraged with it.

Apples, an abundant crop—the trees were too full by more than half.

Peaches with him were a failure. Locusts had injured the trees badly, which he thought was principally the cause. Pears had been a failure with him; and also the finer kinds of cherries. He was dissatisfied with his Clinton grape vines, and thought of grafting them.

Dr. Hull asked if he could succeed in grafting on the Clinton.

Dr. Morse said Mr. Riehl, Dr. Spalding and some others had had bad success in grafting on the Clinton.

Mr. Bush said he had bad luck with the Clinton as a stock.

Mr. Cochrane said he grafted 500 Clinton two years ago, and did not succeed in making one grow.

Mr. Heine said fruit here is very fine this year. Grapes have rotted in some localities and not in others—thinks it may be owing to hills and hollows. Some soils will do better in some seasons than others. Norton's has not rotted at all—Concords some. Where he took the foliage off, grapes had rotted most. Peaches were remarkably fine.

Mr. Christian said his Delawares had lost the foliage and were not ripening the fruit. Norton's sound; Concords had rotted some. Thinks it is owing to bad cultivation and improper pruning. His vineyard was not staked and tied as it should have been.

On the morning after the meeting at Victoria, previously described, we visited the farm of H. S. Christian, near Victoria. He has quite a large and superior vineyard. We probably saw none better—some thought that this the best. His Concords are bearing as good a crop as could be desired. Norton, good, no rot; Herbemont, some rot, some portions remarkably fine; Catawba, lost by rot; Delaware, losing its leaves, and will not ripen the fruit. This is the first year he has failed with the Delaware. The vines are all trained on stakes, probably designed to be temporary, and many of them are breaking down by the load of fruit and winds. The cultivation is very good. Mr. Christian makes very good wine, unusually so, considering the fact that he has no cellar to keep it in.

On our return we visited Mr. Heine, one of the original settlers of the place, where we found a very thrifty vineyard in its third year, with very little rot; fruit not so ripe as in most other localities; slope, eastern, considerably shaded, and potatoes grown between the rows. He has a very fine young apple orchard, bearing well, and fruit beautiful.

APPLE ORCHARDS

In this vicinity are nearly all young—five to eight years old—and nearly all are remarkably healthy, and are bearing abundantly of very fine fruit, showing that this region is eminently adapted to apple growing.

ROADS.

After our return to the hotel we found carriages in readiness to convey us to Hillsboro, a distance of three miles or more. We found the way rough, but a macadamized road is in process of construction between these two villages. We wish here to say a few words in favor of good roads. We had during the morning driven over exceeding rough roads, full of stumps, and showing the want of work badly. How fruit can be hauled over such roads to the railroad depot without serious damage, is more than we can understand or believe. Farmers should spend the necessary time, or pay taxes, to obtain good roads, cheerfully. They will save money by it. It enables them to haul their products to market at any time with safety and comfort to themselves and teams. If the roads are bad, you either cannot haul at all, or you must take half a load, at the risk of injuring your products, breaking your wagons, and distressing the teams. It don't pay.

MEETING AT HILLSBORO.

At Hillsboro we were driven directly to the court house, where we found a goodly company ready to receive us, and the large upper room well filled with tables of fruits, bouquets, etc., and one long table covered with eatables. Fruit growers, their wives, daughters, and sons were present.

The meeting was called to order by Mr. P. C. Whitehead.

A very neat adddress of welcome was made by John L. Thomas, Esq., a lawyer and fruit grower of Hillsboro.

It was responded to by several members of the visiting party.

A discussion upon horticultural subjects followed.

Mr. Murtfeldt said, horticulturists have large hearts. It is impossible for a bad man to be a good horticulturist. The horticulturist should love home and its adornments. His aims and his associations are refining and elevating in their character. The horticulturists labor for others.

Dr. Hull said horticulturists have gone into the business freely, not knowing the discouragements they would meet with. They have found so many insect enemies to contend with, that many have become discouraged. If we had known at the beginning the difficulties we should have to contend with, we would not have planted more than we could have taken good care of. By large plantings, insects are fed and increased.

Committees were appointed to examine and report upon the specimens on the tables.

Of wines, there was fair Catawba, a little too sour, by Elias Hilperhauser.

Concord, not clear, of good body, by Tom Walker.

Herbemont, white, a good article, by the same.

Also about a dozen bottles of Tom Walker's splendid Catawba, of the same that we had at Victoria.

Among so many, we did not learn the names of all the exhibitors of fruit. Prominent among them were Mr. Whitehead, J. P. Booth, J. L. Thomas, Samuel Wright, Tom Walker. Hon. J. H. Morse had a large show of very fine apples, mostly winter sorts.

The peaches exhibited were very large and fine. Among them were many seedlings, several so nearly resembling the Heath cling, that the committee thought they should not be named as distinct.

Dr. Hull stated that the Heath so nearly reproduces itself that it is thought best not to give new names.

Dr. Morse said most of the yellow-fleshed varieties are likely to reproduce themselves from seed, or so nearly so as to give good varities. This is especially the case with the Columbia.

Mr. Wright, who has taken several premiums for fine peaches, was asked about his culture. He said in his pruning he endeavors to maintain uniformity, but would aim to get the southwest side of the tree the heaviest, as a protection from the sun. When the fruit is too abundant, thins out. Jars his trees, and uses a curculio catcher. Such a machine as he has costs about ten dollars.

CODLING MOTH.

Dr. Hull spoke of the codling moth, which is considerably on the increase. In the month of May the perfect insect lays an egg in

the calyx of the apple. It hatches, and the worm eats its way into the core, attains its growth, comes out, and lets itself down by a web to a limb of the tree or the ground. In early fruit, it may come out in a few weeks. It crawls under the rough bark of the tree, or into some crevice, and makes its cocoon. In about twenty days, on an average, it will transform into the perfect insect or moth, to lay eggs again.

As remedies: The first brood may be caught by lights placed in dishes of water. A strong decoction of tobacco may be thrown into the trees to kill the moth. If an old cloth is placed in the crotch of the tree, the worm will crawl under this or between its folds to make its cocoon, when they may be destroyed. They will breed in the cellar where apples are placed, under the barrel hoops, and in other crevices. The hay band, recommended by Dr. Trimble, may be made of any fine hay twisted into a band, and put around the trunk of the tree in three coils. This may be raised up from time to time, and the cocoons destroyed. It is considerable work, and we are apt to be lazy. Thinks woolen cloths in the crotch of the tree are better. Hogs are the best protection in the orchard. They eat up the fallen fruit, and destroy the insects.

The Keswick Codling, Golden Russett, and Duchess of Oldenburg, are the only varieties that have escaped the work of the apple-louse of late. The lady bug destroys these lice, but of late the parasite of the Colorado potato bug has eaten up the lady bugs.

For peaches, he advised growers to catch the curculio, and unite to do it—that is all should do it; and not plant more largely than can be managed.

BORERS.

For the apple-tree borer, Dr. Hull recommended soap, applied to the tree in the latter part of May. He uses it hot, applied with a paint brush to the trunk of the tree, especially near the ground, and has found it effectual.

After enjoying the excellent and abundant dinner, and spending an hour or two more in social chat and the discussion of horticultural affairs, we bid adieu to the Hillsboro horticulturists, having had a very pleasant and profitable season. We returned to Victoria, thence by train to De Soto, where we passed the night.

VINELAND.

Thursday morning we went to Vineland, four miles beyond De Soto, where we were met by a number of the enterprising fruit growers of that vicinity.

Mr. Chester Lyons' orchard was the first visited. The trees are young, thrifty, and heavily loaded with very fair and handsome fruit. He has ten acres of vineyard, newly planted.

We passed next into the vineyard of Mr. E. P. Child. He has ten

acres in the first bearing year, chiefly Concords. The crop is very fine, and no rot. Where none had been gathered, there was twenty to twenty-five pounds per vine, and frequently even more. At the time of our visit he was shipping two tons per day to St. Louis, and had received, up to that time, twelve and a half cents per pound. The vines are trained to temporary trellis of stakes and twine, answering the purpose but poorly, as the owner has found. In this vineyard, like the majority of the others we had visited, crab grass was abundant. Mr. Child has a large orchard of peaches and apples, about one hundred acres, which we did not go through.

Dr. W. S. Dyer, one of the original fruit-growers of this locality, was next visited. He has, in all, about twenty acres in vineyard. His oldest vineyard of Concords has suffered badly with rot. He thinks it was caused by too close planting—six by seven feet we think is the distance. He intends to remove alternate vines, and where this has been done in a small portion, there was little or no rot. The vines removed were bearing well, and no rot. The young vineyard was thrifty and healthy. Nortons, in the third year, had been layered and cut back, consequently were not bearing. Delawares, healthy in foliage. The Doctor made 3,500 gallons of wine last year. We found a cool, breezy place in the packing room above the wine cellar, and felt greatly refreshed by the cool wine which was brought up in liberal quantities from the regions below. The cellar is an excellent one, deep, cool, and tidy.

We took a long walk through the Doctor's extensive young apple orchard, in its fifth year, and were surprised to find it bearing, at that age, so much fine fruit. Some trees had been lost by the borers and replaced.

From Dr. Dyer's we passed through a very flourishing young orchard belonging to Judge Newcomb, and found further evidence to confirm the opinion expressed by more than one of the visitors, that this region is a No. 1 for apples. Judge Newcomb's vineyard shows neglect in cultivation, and the fruit has rotted nearly as bad as Dr. Dyer's.

The next place adjoining is Mr. Brachvogel's. We saw evidence at once of German taste in the good garden and the quantity and variety of flowers surrounding the dwelling. Mr. B. has twenty acres in vineyard, a portion of which is bearing its first crop of fruit. The cultivation is thorough, and the German system of close pruning has been followed—many of the leaves even have been taken off. Consequently the fruit is not so ripe as in other vineyards about here, but the bunches are large and fine. It will be very interesting to see this vineyard in future years, to note the effect of the system of pruning adopted.

Mr. Wm. F. Bowen, one of the most intelligent horticulturists of this neighborhood, accompanied us in our visits. Only a few of the party had an opportunity to see his orchard. Our visit to Vineland,

in fact, was short and unsatisfactory, from the fact that the weather was too hot to enable us to visit carefully the extensive orchards with safety. It happened to be in the hottest week of the year.

A CANNING HOUSE.

After our return to De Soto, we went out about a mile to visit the canning establishment of Mr. John J. Squires. It is a good, substantial building, new, well constructed, and supplied with a steam engine. Mr. S. commenced canning about three weeks before the time of our visit, and was then putting up twenty-six dozen cans a day of sweet corn. He informed us that he took a premium against the world for his fruit preserving jar, at the Paris Exposition, and also for preserved fruits and vegetables. Samples of corn put up in glass looked well. Also, Lima beans, pie plant, green apples, peaches, currants, huckleberries and strawberries were shown, put up in glass, without sugar, apparently in good order.

We regard this establishment as an important one to the fruit-growers of the vicinity, important to Western trade, and one in which the proprietor ought to reap a rich reward. To have our markets supplied with canned fruits and vegetables from Baltimore, New York and Boston, while we have a fruit region unsurpassed, is not creditable to Western enterprise. This canning house is a beginning. The end will be, doubtless, that the East will be supplied with fruit from the West within ten years.

FRUIT DALE FARM AND VINEYARD.

This is the name which Mr. Squires has given to his place. He raises his own sweet corn, etc., for canning; has a fine young orchard and a large vineyard. The latter is five years old, most of it; trailed on trellis of stakes and wire. Portions of it had suffered a loss of one-third by rot. Altogether there was an average good crop. The Clinton had lost its foliage to some extent, an unusual thing; while the Delaware, which is so subject to leaf blight, was doing well. Mr. S. has a good many varieties.

He treated us to excellent Concord wine, of his own make. His wine cellar is new, under one end of the canning house, and 18 by 36 feet in size.

MEETING AT DE SOTO.

In the evening a meeting was held at Masonic Hall. No notice had been sent, or appointment made for this place, and the meeting was hastily summoned by a few citizens, yet there was a very good attendance, except that there were no ladies present. Horticulturally, De Soto is behind many other towns in the county. About two hours were spent in what seemed to be a highly interesting discus-

sion of the horticultural interests of the vicinity, and the citizens present resolved upon the formation of a horticultural society.

The visiting party were not permitted to pay anything at the excellent De Soto House, of Mr. Douthet, but we do not know to whom acknowledgments are due.

VINEYARDS OF THE CLIFF CAVE WINE COMPANY.

On the 28th of September, in company with Mr. Markham, of St. Louis, the chairman made a brief visit to the lands of the Cliff Cave Wine Company, thirteen miles below St. Louis, on the bank of the Mississippi river.

We found the vineyards, consisting of about twenty-two acres, in a flourishing condition. The Concords had rotted to some extent—perhaps one-sixth or more had been lost—but still there is a large crop left. It is a question whether, if grapes were thinned out to a reasonable crop, the rot would not be, to a great extent, prevented. When they are allowed to bear more than a hundred bunches to the vine, is it any wonder that some of them rot, or that the vines are so enfeebled as to induce rot in subsequent seasons? No doubt rot may and does exist independent of overbearing, but we believe that nine-tenths of our vinegrowers permit the Concord to greatly overbear, and it is quite probable that this has an influence in producing rot.

We found Dr. Spalding, the chief proprietor and manager, in his working dress, aiding in the gathering and wine-making. He thought that nearly a quarter of the whole crop had been lost by rot. This estimate seemed to us quite too high.

The Nortons, of which there are several acres, are bearing their first crop, a good one for the first, and no rot; the vines very thrifty and healthy. There were two or three acres of the Ives in a very promising condition, and will be ready for bearing next year. A few rows of the Creveling were in a most pitiful condition—almost entirely destitute of foliage. This locality is evidently unsuited to the Creveling.

The Hartford Prolifics, of which there is nearly an acre, will all be rooted out this fall.

There are several acres of plants, layers and cuttings in a very thrifty condition. These vineyards are under the care of Mr. Chambers, who was formerly with Mr. Mason, of Webster Groves. The cultivation is thorough, and the pruning, we think, a little too much so. To look through the rows, a quarter of a mile long, straight, cleanly cultivated and closely pruned, with a fine crop of fruit, is a beautiful sight; but we believe in summer pinching rather than summer pruning. When we see young canes, the size of our pencil, or larger, cut off with the shears or knife, we cannot help thinking it wrong.

The fruit of the Concord and Norton's in particular, we thought unusually sweet and rich here.

About a quarter of a mile from the vineyards there is a large cave, which it is proposed to convert into a wine cellar. The mouth of it is undergoing improvement, and is nearly ready to receive a portion of this season's vintage.

L. D. MORSE, *Chairman Committee.*

OFFICERS AND MEMBERS FOR 1870.

PRESIDENT.

DR. H. CLAGGETT, St. Louis, Mo.

VICE PRESIDENTS.

First	Congressional	District—	N. J. COLMAN, St. Louis.
Second	"	"	T. W. GUY, Sulphur Springs.
Third	"	"	G. B. CLARK, Potosi.
Fourth	"	"	D. S. HOLMAN, Springfield.
Fifth	"	"	F. A. NITCHY, Jefferson City.
Sixth	"	"	G. S. PARK, Parkville.
Seventh	"	"	H. M. VORIES, St. Joseph.
Eighth	"	"	O. H. P. Lear, Hannibal.
Ninth	"	"	WM. STARK, Louisiana.

RECORDING AND CORRESPONDING SECRETARY.

WM. MUIR, Fox Creek Post office, St. Louis County, Mo.

TREASURER.

JOHN H. TICE, St. Louis, Mo.

COMMITTEES.

Business.—H. H. Vories, H. T. Mudd, C. W. Murtfeldt.

Entomology.—C. V. Riley, Dr. J. G. Norwood, Dr. E. S. Hull.

Flowers.—M. G. Kern, Chas. Connon, J. H. Tice, Prof. O. Root.

Vineyards.—Saml. Miller, I. Bush, E. R. Mason.

Orchards.—Richard Barron, I. Snediker, J. J. Kelley, F. W. Bowen.

Vegetables.—Dr. Spalding, F. F. Fine, Wm. Harris.

Bees.—A. E. Trabue, T. R. Allen, A. A. O. Gardner.

Ad Interim.—North District—A. J. Stewart, Geo. S. Park, B. F. Lazear.

South District—Dr. L. D. Morse, N. J. Colman, F. A. Nitchy.

SPECIAL COMMITTEE

To procure members and report to Treasurer at once:

H. M. Vories, St. Joseph.
Dr. E. S. Hull, Alton, Illinois.
C. Connon, Webster.
Wm. Stark, Louisiana.
John H. Tice, St. Louis.
H. T. Mudd, Kirkwood.
F. R. Allen, Allenton.
Geo. Husmann, Bluffton.
Isidor Bush, Bushberg.
Wm. Muir, Fox Creek.

MEMBERS.

F. F. Fine,
J. S. Marshall,
S. W. Forder,
J. H. Pierce,
Edward Reed,
R. B. Price,
Prof. Orin Root,
J. H. Shields,
Prof. J. G. Norwood,
A. Willis,
Dr. L. D. Morse,
Elder J. M. Robinson,
J. M. Douglass,
R. L. Todd,
O. A. A. Gardner,
D. H. Hickman,
M. P. Lentz,
J. W. Harris,
Richmond Pearson,
G. M. Dewey,
Wm. Stark,
Jacob Studley,
A. E. Trabue,
O. H. P. Lear,
T. W. Guy,
J. M. Ward,
Dr. J. N. Stewart,
E. F. Bennett,
E. R. Mason,
C. W. Murtfeldt,
C. W. Spalding,
N. J. Colman,
Chas. Peabody,
B. M. Veatch,
J. B. Turner.

PROCEEDINGS

OF THE

ANNUAL MEETING

OF THE

MISSISSIPPI VALLEY GRAPE GROWERS' ASSOCIATION.

ANNUAL MEETING

OF THE

MISSISSIPPI VALLEY

GRAPE GROWERS' ASSOCIATION.

The meeting was held at Mercantile Hall, in Alton, Illinois, April 13, 1869, and was called to order by the President, Dr. C. W. Spalding, at 10 o'clock precisely.

James E. Starr, Esq., President of the Alton Horticultural Society, gave the Association a hearty welcome to the hospitalities of the citizens of Alton, as follows:

Mr. President and Gentlemen:

At your last session, held in St. Louis, an invitation was tendered you by the Alton Horticultural Society, requesting you to hold your next convention in this city. In response to that invitation you are now assembled. Your mission, the extension of vine culture, while it is stimulated by the hope of personal reward to its votaries, is not without the noble and high incentive of good for your fellow men. At present the circle of your influence is comparatively small, but when the capabilities of the great Valley of the Mississippi shall be understood and developed, when the banks of our noble river shall be adorned with vine clad hills, and teeming thousands shall find both profit and pleasure in the culture; when the population that shall fill the land shall find solace, health and pleasure in the wine cup rather than the stupefying lager or the intoxicating whisky, then you will have accomplished a great work, and your influence will have become as wide spread as the name of your association indicates. To be allowed to gather knowledge from your deliberations, and wisdom from your councils; to add our mite, humble though it be, to the general stock is our privilege at this time. The Alton Horticultural Society, for itself and the citizens of Alton, desire to welcome you

heartily, honestly. They bid you God speed in your noble work. Their sincere desire is that no effort shall be spared, no word unspoken, that shall add to your comfort while among us.

President Spalding accepted the tendered hospitality on behalf of the Association in an appropriate manner, stating that our Association, although small in numbers, had a large mission, namely, the good and progress of the grape growing interest in the great Mississippi Valley.

A letter from William Muir, Secretary of the Association, was read, stating that he was still confined to his bed by indisposition, occasioned by the accident, of which he was the unfortunate subject.

Mr. John M. Pearson, of Alton, was chosen Secretary *pro tem.*

The President then announced the following business committee: James E. Starr, B. F. Lazear and J. H. Tice.

Time was then allowed for the payment of fees, etc., after which the business committee reported the following order of exercises:

1st. Hours of meeting, from 9 A. M., to 12 M., and from 2½ to 5½ P. M.

2d. Selection of Wine Committees.

3d. Special order for Tuesday: President's address at 2½ o'clock, P. M.; election of officers at 3, P. M.; election of Executive Committee.

The President made the announcement that if any member wished to compete for the premium for the best collection of wines he should hand in his name to the Secretary; and stated there was no money premium offered for this class of wine, but an article valued at $35 would be awarded. Considerable discussion was had upon the subject of exhibitors acting on committees to award premiums, for which said exhibitors were competing, Dr. Claggett taking the ground that this course at the last meeting caused much dissatisfaction, and deterred many from attending this meeting, and from sending specimens of their wine for competition.

Mr. J. E. Starr remarked that he was astonished that any should have entertained such an opinion, as he believed it was impossible for those who were not acquainted with the merits of wine to judge of its quality, and was sure whoever might be appointed on committees (even if they were competitors for the same premium) would act in an honorable manner.

Mr. Eisenmeyer then moved that no exhibitors shall act on the same committee in which his own wine is placed.

After further discussion, the motion was unanimously adopted.

The regular order of business—being that of appointing committees on awarding premiums to the best specimens of wine—was taken up.

The President stated that exhibitors of the different wines would choose the awarding committees.

Exhibitors of Concord were then requested to select the committee for that variety, with the following result: Adolph Engleman, chairman, Wm. Stark and Dr. Hermann Roesch.

Norton's Virginia was next in order, and Dr. L. D. Morse, chairman, G. C. Eisenmeyer and G. Mariot were chosen.

The Ives and Clinton varieties were referred to the committee on Norton's Virginia.

Best Red Wine—Dr. C. W. Spalding, Louis Winter and E. A. Riehl were chosen.

Best Catawba—Exhibitors, after consultation, nominated John M. Pearson, Dr. Spalding and Dr. E. S. Hull.

Best Delaware—A. Starr, G. Marlot and A. Engleman.

Herbemont was referred to same committee.

Best White Wine of any variety—Committee, Dr. Morse, Dr. Hull and Mr. E. M. Veatch.

Best Mixed Wines—F. Bertman, C. V. Riley and F. Starr.

Sparkling Wine—Dr. H. Claggett, H. J. Hyde and C. W. Murtfeldt.

Best Collection—Dr. G. M. Dewey, Capt. D. Stewart and Dr. Hull.

Dr. Hull moved to change the hour of meeting from 2½ o'clock to 2 o'clock, P. M., which was carried, and the meeting adjourned to 2 o'clock, P. M.

AFTERNOON SESSION.

The Association met pursuant to adjournment.

President Spalding then read his address, making such recommendations in regard to cultivation and varieties of the grape as he thought were for the best interests of the grape grower:

ADDRESS BY DR. W. C. SPALDING, PRESIDENT.

Gentlemen of the Mississippi Valley Grape Growers' Association:

In the Providence of God we are again permitted to assemble together for the purpose of interchanging views and comparing our experiences relative to that most enticing branch of horticulture which it is the object of this society to encourage and promote. Custom demands a few opening remarks from your presiding officer, but in conforming to this usage, I shall on this occasion be very brief, believing that your time will be more profitably occupied in the discussions and other regular business which will come before the meeting.

The number of intelligent growers present at this, the fifth meeting of our young society, serves to confirm its founders in their previous conviction that the progress which the culture of the grape was making, and the proportions which it had already attained, demanded an organization devoted entirely to that particular speciality. Our society may now be said to have passed the period of infancy, and to have entered upon the more active period of youth. May it soon attain the vigor and strength of manhood, and may it long maintain among the permanent institutions of our time a useful and influential position, which shall enable those who have labored for its establishment to look back with pleasure and pride upon their early efforts in its behalf!

The grape is one of the oldest and noblest of fruits. Secular histosy, in its earliest periods, contains interesting accounts of the vine and its culture. Indeed, in all latitudes where it successfully thrives, its history is co-extensive with that of civilization and refinement. Even in climates too rigorous or congenial for its open culture, and where the product of the vine is regarded as a luxury, the gratification of a refined taste has led to a resort to artificial means for its production.

In our broad and noble valley the culture of the grape has but just begun. Its various soils and its diversity of climate afford an ample field for the introduction of kinds both new and old, and it may safely be predicted that the time will come when our wines shall equal in variety and quality those of any portion of the world. Already what has been accomplished is sufficient to solve the problem of success, and what is more to establish the fact that in *certain classes* of wine we can now compete successfully with the products of foreign countries. At no distant day the consumption of foreign wines will become the exception as it has heretofore been the rule, and we shall then have demonstrated to the American public that all which we have claimed for American wines will have been realized, and the millions of dollars that now go abroad annually for the purchase of the wines of other countries will be retained at home.

The efforts of this society should be directed towards the accomplishment of this stupendous result in the shortest practical time.

The question naturally arises "How can this be done?" There are just two important things to accomplish, and the work is done: first, the production of wines in such great variety as to compete with all the foreign sorts; and second, to bring them to market at so cheap a rate as to displace the imported article. With red wines, this, to a considerable extent, has already been accomplished. Much the largest proportion of the red wines now imported belong to the Bordeaux and Bungundy classes.

Our Concord, Ives, Norton's Virginia and Cynthiana are being rapidly substituted for these wines; and when we shall have done for the white wines what these four varieties have done, and are now

doing for the red, we shall have taken a long stride towards the end we are seeking to realize.

Our markets are supplied with wines from France, Germany, Portugal, Spain, and the islands and shores of the Mediterranean. Our people are accustomed to the use of all these different kinds, and to possess ourselves of the American market, we must furnish wines similar to all these, or substitute for them other wines which shall prove equally acceptable to the tastes of consumers. That we are in a fair way of doing this with red wines, I have already stated. But what can be said of our prospects for substitutes for the light-colored wines, which are now so largely imported?

The old Catawba can not be relied on to supply this want to any considerable extent, for it is evidently failing even in localities where it has heretofore succeeded. Where, then, are the new sorts that are to yield these light colored wines? I can at this time name but a single variety of which it can be safely said that it has been sufficiently tested to give a fair promise of being equally hardy and productive with the four kinds named above. I allude to the Martha. There are other varieties, as the Maxatawney, several of the Rogers' Hybrids, etc., for which this claim is asserted, but up to this time they are still on trial, and no one could feel safe in planting them extensively. The same may be said of the Delaware, excepting in a few favorable localities where it is now doing well. Yet even at these points the vineyards are still too young to give entire assurance of ultimate profit.

The southern Æstivallis, of which the Herbemont will serve as the representative, is not wholly suited to our climate. The more skillful and painstaking will grow them with success. Yet the winter protection necessary for this class of grapes is against their general introduction. The American grape grower demands something that will alike endure our summer's heat and our winter's cold.

For the production of a fair assortment of white wines, we must still look to the further introduction of new varieties, possessing the hardihood and productiveness of the Concord and Norton.

It becomes the members of this association, therefore, to test, individually, all new varieties which appear to have any just claim to filling this evident want. Several years are required to definitely determine the merits of any new grape, and if we were in possession of one or more sorts, at this time, which had all the requisite good points, a good deal of time must elapse before we could prudently recommend it for general cultivation.

In this connection, there is one point relative to the origination of new varieties, to which I wish to call attention. It is the almost universal custom of crossing our native species with the *vitis vinifera* or European grape. None of this species have found a home on the eastern slope of our continent, but all of them have proved more or less liable to disease, and their cultivation for vineyard purposes has

been wholly abandoned. Why then seek to infuse this sickly blood into our species? The best and most successful grapes we have are thoroughly native, and the four or five distinct species indigenous to our country certainly cover all the points of excellence that can possibly be wished for. Why not, then, endeavor to combine these native excellencies by the crossing of our native species? I am confident that the highest success attainable from systematic cross-fertilization lies in this direction, and he who leads in the development of the latent resources which exist in this almost unexplored field will confer a lasting benefit upon the public, and reap for himself an ample reward.

Mr. Husmann, of Missouri, took the floor in opposition to one point in the President's address, namely, the statement that the Martha seemed to be about the only grape that could be generally relied upon to make a white wine that would compare favorably with foreign white wines. He thought that Rogers' No. 1 and 9, the Maxatawney, and for some localities, the Cassady were equal to the Martha for white wine. The idea that we must have a grape that will suit all locations, is one of the fallacies of the age. Rogers' No. 9 is much like the Catawba, has done well so far. No. 8 has not been so well tested, but promises well. Of all he had cultivated, no grape had paid him better than the Herbemont. Every grape grower ought to be willing to take the little trouble necessary to secure a crop by winter covering. The Taylor he thought had not been sufficiently tried. The past year it had yielded him a good crop. It does better as it becomes older. From these varieties we can make good white wine, and enough of it.

In answer to a question, Mr. Husmann said the Taylor vines he had just referred to were not impregnated by any other variety. He had come to the conclusion, now, that the Taylor will produce enough when it gets old enough to admit of spur pruning.

The hour for it having arrived, the Association proceeded to the

ELECTION OF OFFICERS.

Mr. Riehl and Mr. Hyde were appointed tellers.

The President declined a re-election, and gave what he deemed good reasons, and thought that the interests of the Assiciation demanded a change in the office of President, as he had filled it for the past two years.

Ballots were distributed to members, and then collected and counted at the Secretary's desk with the following result:

President—James E. Starr, of Alton.

Vice President—Geo. Husmann, of Missouri.

Secretary—Dr. L. D. Morse, of St. Louis.

Treasurer—J. H. Tice, of St. Louis.

Executive Committee—Dr. C. W. Spalding, Dr. E. S. Hull, H. G. M'Pike, Geo. Husmann and E. A. Riehl.

The newly elected President was conducted to the chair. He thanked the Association for the honor conferred, and pledged himself to do his utmost to advance the grape growing interest in the Mississippi valley.

The other officers took their respective positions.

GRAFTING THE GRAPE.

Mr. Lazear, of Pike county, Mo., moved to take up the subject of grafting the grape. Carried.

Mr. Lazear: Can we take up vines and graft them in the house during winter, and set them out in the spring with success?

Mr. Husmann said he had practiced grafting old stocks in the vineyard with good success, but had succeeded very poorly in the way proposed. Mr. Miller, of Bluffton, had succeeded better on pieces of roots, forwarded under glass. He puts them closely in a box, and then puts them in a hot bed. Thinks it has a tendency to promote a more vigorous growth in slow growers to graft them on vigorous growers. Some varieties are probably better adapted to each other than others, but he has succeeded very well with all.

Mr. Richmond, of Ohio, said he had practiced grafting the grape in the way proposed, and failed. Had tried them in hot bed with good success.

Dr. Dewey, of Chariton county, Mo., said he has some grafted grape vines packed away in sawdust now; so far they look well; will be able to report at the end of the season.

On motion, it was resolved to meet at half-past seven o'clock in the evening.

Mr. Pearson, of Alton, asked what grape shall we plant? What is the variety that in three years from now will be most in the market?

Mr. Eisenmeyer said, if you plant Hartford Prolific, Concord, Herbemont and Taylor's Bullitt, he thought it best not to plow very deep—twelve to fifteen inches—and put them on the poorest soil. For slow growing varieties plow twenty inches deep. This was best, according to his experience. Wherever you can raise Delaware, on rich bottom, raise them. He did not praise the Clinton much, but thought it well enough to have a few of them. It is a strong, healthy grower.

Mr. Flagg said, we should cultivate grapes that will both sell and make wine. He should plant early, medium and late sorts; is inclined to choose Ives, Concord and Catawba.

Dr. Dewey said he had fruited Rogers' No. 4 two years; it is healthy and does not drop. Does not think Ives makes a good market grape. In his locality (Chariton county, Mo.,) the Delaware does finely, makes a vigorous growth and has no fault.

Mr. Peabody said, if planting largely for market, Mr. Flagg's sug-

gestion is good. Concord cracked badly in Jefferson county, Mo., last year. The Creveling is a delicious grape, next to Delaware—not quite so compact—same luxuriance as Concord; has borne abundantly two years; delicious, high flavored and sweet. Rogers' No. 1 does well on our bluffs; more prolific than No. 4. What would do well on Mr. Flagg's soil would not probably do so well on mine. Every locality must experiment for itself.

Mr. Richmond, of Sandusky, Ohio: The Rogers' Nos. 4, 15 and 19 are our best grapes. Catawba is still considered one of our best grapes.

Mr. Eisenmeyer: The Concord sells better than Ives.

Dr. Claggett, of St. Louis: The most saleable grape is the Delaware, next the Concord; believes more buyers will take the Concord at the same price in preference to the Delaware, but Delaware will command the highest price.

REPORT ON WINE EXHIBITED.

Concord—We give the names of those to whom the premiums were awarded, and also the name of each exhibitor, with the figures showing the grade, in the scale of 100, at which the sample was marked:

First premium to A. & F. Starr, Alton, Ill., grade 89; second premium to same exhibitors on another sample, grade 87; third premium to J. J. Kelly, Webster Grove, Mo., grade 82; sample from Cliff Cave Wine Company, St. Louis, grade 80; A. Eberhard, Portland, Mo., 71; Poeschell & Scherrer, Hermann, Mo., 71; S. H. Long, Alton, Ill., 72; Jacob Madinger, St. Joseph, 79½; F. Mueller, South Point, Mo., 72; Dr. G. M. Dewey, Keytesville, Mo., 77; James D. Davis, Clarksville, Mo., 70; James D. Davis, Clarksville, Mo., 71; E. A. Thompson, Cincinnati, Ohio, 77; James E. Starr, Elsah, Ill., 76; G. Marlot, Bear Creek, Ill., 71; R. F. Lazear, Louisiana, Mo., 65; F. M. Redburn, Keytesville, bad cask; Bluffton Wine Company, Bluffton, Mo., 78; J. J. Kelly, Webster Grove, Mo., 69.

Norton's Virginia.—First premium to Poeschell & Scherrer, Hermann, Mo., grade 91⅛; second premium to F. Mueller, South Point, Mo., grade 88½; third premium to Dr. G. M. Dewey, Keytesville, Mo., 82; H. G. McPike, Alton, Ill., 76⅜; H. G. McPike, Alton, Ill., 75½; E. A. Thompson, Cincinnati, Ohio, 74; Bluffton Wine Company, Bluffton Mo., 81; James E. Starr, Ill., 81⅛; Christian Bicklen, Burlington, Iowa, 77⅛.

Clinton.—First premium to James E. Starr, Elsah, Ill., 83½; second to Bluffton Wine Company, Bluffton, Mo., grade 75; third to J. L. Coons & Bro., Winchester, Ill., 66⅛.

Ives.—First premium to E. A. Thompson, Cincinnati, Ohio, grade 86⅜; second to Bluffton Wine Company, 78⅜.

BEST COLLECTION OF WINES BY ONE EXHIBITOR.

Your committee, to whom was referred the above named samples

of wine, report that they find two competitors for the premium, J. E. Starr, of Elsah, Ill., and the Bluffton Wine Company, Mo., the former with five samples, as follows:

Catawba, graded, 77; Clinton, 83⅛; Concord, 76; Delaware, immature; Norton, 81⅝.

The Bluffton Wine Company presented twenty samples, two of which have been mislaid, the remaining eighteen we grade as follows:

Cynthiana (very fine), grade 93⅛; Catawba, 85; Clinton, 80; Herbemont (white), 88; Devereaux, 86⅜; Norton, 84; Rulander, 86; Concord, 78; Creveling, 80; Maxatawney and Martha, in equal proportions (best of all), 96; Ives, 81⅜; Delaware, 77; Taylor's Bullitt, 88; Rogers' No. 9 (extra), 93⅛; Rogers' No. 4, 85; Missouri Port, equal to any Commercial Port; Herbemont (red), 81; Cunningham, 82.

We award the premium to Bluffton Wine Company.

JOHN M. PEARSON,
E. S. HULL,
L. D. MORSE,
Committee.

BEST RED WINE.

Catawba.—The Committee on Catawba Wine presented the following report, with lists of all the samples presented, and figures showing the grade at which they were ranked:

Your committee, to whom was referred the samples of Catawba, beg leave to report that they have had set before them twenty-one samples for competition; have examined them with as much care as possible, and beg leave to report the following list, with accompanying remarks and grade of each:

No.	Maker.	Vintage.	Grade.	Remarks.
1	F. Braches, Gray's Summit	1866	95	Very superior, fine bouquet.
2	" " "	1867	80	
3	" " "	1868	80	
4	Poeschell & Scherrer, Hermann, Mo.	1868	68	
5	H. G. McPike, Alton, Ill.	1868	60	Contained unfermented sugar.
6	J. C. Saxton, East Cleveland, Ohio.		58	" " "
7	Otto Moning		...	Bottle accidentally broken.
8	Dr. O. Lumaghi, Collinsville, Ill.	1862	72	
9	" " "	1863	77	
10	John Bauer, Nauvoo, Ill.		78	
11	F. Mueller, South Point, Mo.		70	
12	A. Engleman, Shiloh, St. Clair Co Ill	1867	83	The must weighed 93° and reduced to 91°.
13	E. A. Thompson, Cincinnati, Ohio.		75	
14	G. Marlot, Warsaw, Ill.	1868	77	
15	B. F. Lazear, Louisiana, Mo.	1868	72	
16	" "	1867	77	
17	J. L. Coons & Bro., Winchester, Ill.		78	
18	Bluffton Wine Company		78	
19	J. E. Starr, Elsah, Jersey Co., Ill.	1868	77	
20	J. J. Kelley, Webster, Mo.		82	
21	C. Bicklen, Burlington, Iowa		58	Spoiled by acetic fermentation.

They also have examined eight samples entered for gradation, and submit separate list of same:

No.	Maker.	Grade.	Remarks.
1	Adolph Engleman, Shiloh, Ill	88	
2	" " "	60	
3	A. & F. Starr, Godfrey, Ill	77	
4	B. L. Mott, Jersey county, Ill	50	
5	Dr. J. Studer	69	
6	Louis Winter	78	
7	L. Stutz, Alton	75	
8	Wm. Elliott Smith, Alton	50	Too sweet.

We also graded one sample of Cunningham, from A. Engleman, grade 82.

We also take occasion to congratulate the Society upon the great improvement in the average quality of these wines over those of former exhibitions. We call attention to the second list, and would like to impress upon the minds of our members the importance of thus bringing these wines together, in order that each may know the relative value of their own manufacture.

The committee award the first premium to F. Braches, Gray's Summit, Mo., second premium to Adolph Engleman, of Shiloh, St. Clair county, Ill.; third premium to J. J. Kelly, Webster, Mo.

JOHN M. PEARSON,
C. W. SPALDING,
E. S. HULL,
Committee.

DELAWARE.—First premium awarded to James D. Davis, Clarksville, Mo., grade, 85; second premium to E. A. Thompson, Cincinnati, Ohio, grade, 83⅛; third to Bluffton Wine Company, Mo.; grade, 78⅛. Sample by Dr. G. M. Dewey, of Keytesville, grade, 63⅛; samples by James E. Starr, of Elsah, Ill., was marked immature.

HERBEMONT.—First premium awarded to Dr. G. M. Dewey, of Keytesville, Mo., grade, 81⅜; second to the Bluffton Wine Company, grade 76. Sample from G. C. Eisenmeyer, of Mascoutah, Ill., broken.

TAYLOR'S BULLITT.—First premium awarded to the Bluffton Wine Company, grade, 86⅜.

BEST WHITE WINE.—The premium was awarded to the Bluffton Wine Company, for wine from Taylor's Bullitt. The committee graded the samples submitted, relative to each other, and the figures are as follows: Cunningham, 80; Catawba, 85; Taylor's Bullitt, 91; Delaware, 88⅛; another sample of Catawba, 83; Herbemont, 88; Diana, 70; new variety (unnamed), 90; Hartford Prolific, 75. The new variety was from Mr. Glaser, of Hermann, Mo. It was considered a wine of excellent character, delicate aroma, pale reddish or crimson color, said to be a seedling of the *Labrusca* class.

BEST WINE OF MIXED VARIETIES.—Premium awarded to John Bauer, of Nauvoo, Ill., for samples marked "Norton and Burgundy," grade, 87⅞. The other samples were as follows: One from H. G. McPike, Alton, Ill., grade, 74; H. J. Hyde, Alton, Concord, ⅛, and Clinton, ⅛, grade, 78; A. Engleman, Shiloh, Ill., 86; E. A. Thompson, Cincinnati, Ohio, Concord, Ives and Creveling, 84; G. C. Eisenmeyer, Mascoutah, Ill., 84; Bluffton Wine Company, Concord and Norton, 79; James E. Starr, Elsah, Ill., Concord and Delaware (mixed after fermentation), 84; G. Marlot, Bear Creek, Ill., Norton, Delaware, Herbemont, Clinton and Diana, 68.

SPARKLING WINES.—Your committee to whom was referred the sample of Sparkling Catawba, declare it to be very good, grading 90 in the scale of 100 points; worthy of the first premium.

H. CLAGGETT,
H. J. HYDE,
C. W. MURTFELDT,
Committee.

Mr. Lazear, of Pike county, Mo., said he had shipped grapes to St. Paul, Chicago and St. Louis. It has not paid well to send to St. Paul and Chicago. Thinks he can make more money by selling Concord at five cents than Delaware at fifteen cents.

Mr. Mason thinks he has prevented the Concord from bursting, and prolonged the season of ripening, by stripping leaves from the vines. To plant understandingly, you should visit the nearest vines in your locality and see what is doing best. Thinks no man in the Mississippi Valley can yet recommend the Ives. This, as well as others, must be better tried.

Mr. Caywood had visited Pike county, and had recommended the Walter in such a way that it gave him confidence in it. The Catawba had succeeded well with him. Vines in yellow clay had done better than those on limestone hillsides. His Catawbas are six years old this spring; has had no mildew on the leaves, but something like it on the fruit.

Mr. Eisenmeyer was opposed to stripping the leaves from vines—thinks it will impair the vitality of the vines.

Dr. Claggett said Mr. Mason had the finest Concord vineyard that he knew of; but he (Dr. C.) would not recommend pulling off the leaves; thinks Mr. Mason's vines have been enfeebled by it.

Mr. Peabody had been told that Mr. Mason does not pull off leaves except from the bearing wood.

Dr. Edwards confirmed that information, and thought it was not likely to do damage; thought Mr. Mason's vines had been injured by over-cropping. Dr. E. said he had tried over one hundred varieties in Jefferson county, Mo. Nothing has succeeded so well as the Herbemont. One severe winter had killed down some, but bore next year. Rogers' No. 15 has stood well.

Mr. Eisenmeyer endorsed what Dr. Edwards said about the Herbemonts; but it is difficult to propagate. He offered the following resolution:

Resolved, That it is the opinion of this Association that more vineyards are injured from over-cropping than from anything else.

Mr. Tice said he would not advise any one to crop as heavily as Mr. Mason has done. The fruit will be insipid. Mr. M. had over-cropped one year in particular, and had a light crop the next year.

Mr. Lazear asked, what is over-cropping?

Dr. Edwards said, the resolution is a general declaration; is satisfied his own vineyards have been injured by over-cropping. The evil effects of an over-crop are not regained in years; thinks no vineyard ought to be allowed to bear 10,000 pounds to the acre.

Dr. Claggett thought the resolution good as a caution to new beginners. We should aim to err on the safe side. Resolution adopted.

SECOND DAY.

WEDNESDAY, April 14, 9 A. M.

Association was called to order at 9 A. M.

President Starr in the chair.

The several committees who had not yet acted upon the wines placed in their charge were called upon to take action immediately, and make their report.

The first hour of the session was taken up in this manner, and then regular business was brought forward.

The President stated several matters of importance should be decided before adjournment, among which were the next place of meeting, and time thereof, and whether a premium grape exhibition should be held in connection with it.

Dr. G. M. Dewey offered the following resolution:

Resolved, That those exhibitors who receive premiums from this Association shall furnish a statement of the manufacture of the wines on which they receive premiums, and that the statements shall be published with the proceedings.

Dr. Edwards spoke very forcibly in favor of this resolution; that it was the duty of members who made good wine to let the mode of manufacture be known.

Mr. Husmann thought the resolution could not be carried out in spirit.

Mr. Riehl said he deemed the resolution rather arbitrary in its nature; thought this was not the time for such a rule to be established.

Dr. Edwards remarked that if members were unwilling to give

the mode of the manufacture of their wine, he was opposed to giving premiums to such persons. Said a statement of the manufacture of the wine should accompany each sample for competition for premiums.

Mr. McPike coincided with Mr. Riehl's views, as to the resolution being arbitrary, and moved as an amendment, that members be *requested* to give such statement.

Mr. Lazear thought that there could be no objection to telling the manner of the manufacture of premium wines.

Dr. Claggett said there was much prejudice existing in regard to gallizing wine; some persons would spit out wine made in this way, if they knew it; when, if they had not known it, would have decided it to be good wine.

Mr. Husmann objected that no one could give a correct statement which would apply in every case, or in a majority of cases, as grapes one year are quite different from those of another, hence needing different treatment. The Catawba of 1867 and the Catawba of 1868 were very dissimilar.

Mr. Snediker, of Jerseyville, thought the Society's object was to teach those who did not understand wine-making; that no narrow or contracted views should be held by any on this subject; if a member knew how to make good wine, he should give that knowledge to the Society.

Mr. Husmann remarked that by discussing the making of wine, more practical results would follow than from taking up precious time with the resolutions.

A vote was then had upon the passage of the resolution, which resulted in its defeat by one majority.

Mr. Lazear offered a resolution that a committee of five be appointed to prepare a premium list for grapes at the fall meeting. Carried.

It was decided to hold the fall session at St. Louis.

Mr. J. H. Tice submitted the following:

Resolved, That hereafter this Association will devote one session to the discussion of the mode of treatment of the "must," having particular regard to its condition, as affected by the seasons, as well as to its normal condition generally. Adopted.

Rev. Mr. Peabody submitted the following:

Resolved, That the President of this Association be authorized to confer with the officers of the Missouri State Horticultural Society; and if, in their judgment, such a combined exhibition is praticable and promising useful results, they be authorized to make such a plan, or such arrangements, and the President be authorized to do so if it is thought expedient. Passed.

Mr. Lazear moved that the Society meet in St. Louis on the second Tuesday in September, 1869, which was amended and passed by giving the President and Executive Committee power to fix the date

at such time in September as will be for the best interests of the Society.

Dr. Hull moved that members (only), at the fall meeting, be allowed to post up notices of wines, which they had for sale, in the hall of exhibition.

Committee on Final Resolution presented the following as their report, which was adopted without dissent:

Resolved, 1st, That the thanks of this Association are due and hereby tendered to the citizens of Alton for the very cordial manner with which they have received us, and the munificent provision made for our accommodation during our stay amongst them.

2d. That to the Alton Horticultural Society many obligations are due, for its generous accommodation in providing for us, free of charge, the Mercantile Hall for holding the sessions of this Association.

3d. That we are indebted to the publishers of the Alton *Telegraph* and the St. Louis *Democrat* for publishing our daily proceedings in their enterprising and influential papers.

4th. That we are under continued obligation to the liberality of the managers of the several railroads in Illinois and Missouri, for the kindness extended to the members of this Association—the St. Louis, Alton & Chicago and the Terre Haute railroads returning the members for one-fifth regular fare, and all the railroads in Missouri free of any charge. The Ohio and Mississippi being the only one that had the illiberality of refusing the usual facilities asked for.

5th. That to the Alton Packet Company we are also indebted for the offer to return free of charge our members on their boats.

JOHN H. TICE,
C. W. MURTFELDT,
Committee.

Rev. Mr. Peabody introduced the subjoined resolution, which passed unanimously:

Resolved, That the thanks of this Association are due, and are hereby tendered to its late President, Dr. C. W. Spalding, by whose labors and under whose management the Mississippi Valley Grape Growers' Association has acquired a standing as an institution, promising important results in the future.

A motion to adjourn *sine die* was then adopted.

ERRATA.

The date of the killing frost in October was the 24th and 25th, as stated in the review. and not as at first given, on page 38.

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SECOND ANNUAL REPORT

ON THE

Noxious,

BENEFICIAL AND OTHER

INSECTS,

OF THE

STATE OF MISSOURI,

MADE TO THE STATE BOARD OF AGRICULTURE, PURSUANT TO AN APPROPRIATION FOR THIS PURPOSE FROM THE LEGISLATURE OF THE STATE.

BY CHARLES V. RILEY,

STATE ENTOMOLOGIST.

JEFFERSON CITY:
Horace Wilcox, Public Printer.
1870.

PREFACE.

To the Members of the Missouri State Board of Agriculture:

GENTLEMEN:—I herewith submit, for publication, my Second Annual Report on the Noxious, Beneficial and other Insects of the State of Missouri.

For my First Report, I prepared two lithographic plates, a certain number of which were colored. Such plates, when well executed, are an adornment to any work, but they are expensive; and upon conferring with different members of the Board, it was thought best to furnish two such plates for one-half the edition, rather than one plate for the whole edition. The plan has not worked well, however, since many of those persons most interested in the Report, and for whom it is more especially designed, failed to get copies which had plates.

For this Second Report, therefore, I have confined the illustrations to wood. Most of these wood-cuts are executed in the best style of the art, but they cannot possibly show to good advantage on such paper as was used in last year's Report; and the pains taken in the preparation of these cuts, and in hiring the very best engravers the country affords, seems too much like waste of time and means, when their effect is so spoilt by poor ink and poorer paper. If it is in the power of the Board, by proper action, to secure a better quality of paper for this Report, I sincerely hope that such action will be taken; for a clear impression of an insect cut is often absolutely necessary, to enable the general reader to recognize, in the field, the living form of the particular species which it represents.

The cause of Economic Entomology lost one of its greatest champions, and the farmers and fruit-growers of the West, and especially of our sister State, Illinois, suffered an irreparable loss, in the sudden death, on November 18th, 1869, of Mr. Benj. D. Walsh, of Rock Island. At the time of his death, he was State Entomologist of Illinois, and my Associate in the Editorship of the *American Entomologist*, published at St. Louis; and I hardly need say that this sad and unexpected fate of my friend has very much increased my own labors. When I add to this the fact that Mr. Walsh was prostrated for over three months last spring and summer, and that Mr. Wilcox, our State Printer, was ready for this Report at an earlier day than I had

anticipated; you will not be surprised to learn that several subjects which I had contemplated treating of, have been unavoidably deferred another year.

In order to make the sense of the text plain to every reader, and at the same time to insure scientific accuracy, I shall continue to conform to the rules laid down in the introduction to my First Report—namely, to print all descriptions of merely scientific interest in small type; to use as far as possible a common name for each insect, always adding the scientific appellation in *italics* and parenthesis, so that it can be skipped, if necessary, without interfering in the least with the sense of the sentence; and to give the Order and Family to which each insect belongs, in parenthesis under each heading.

The reader will also bear in mind that the dimensions given, are expressed in inches and the fractional parts of an inch, 0.25 thus implying a quarter of an inch; and that the sign ♂ is an abbreviation for the word male, the sign ♀ for female, and the sign ♀ for neuter.

My grateful acknowledgments are due to the Superintendents of the Missouri Pacific, South Pacific, Iron Mountain, Hannibal and St. Joseph, North Missouri, and Illinois Central Railroads for free passes over their respective routes.

All which is respectfully submitted by

CHARLES V. RILEY,
State Entomologist.

St. Louis, Mo., Dec. 2, 1869.

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NOXIOUS INSECTS.

REPORT OF THE COMMITTEE ON ENTOMOLOGY.

READ BEFORE THE MISSOURI STATE HORTICULTURAL SOCIETY, AT ITS ELEVENTH ANNUAL MEETING, BY C. V. RILEY, CHAIRMAN OF THE COMMITTEE.

In the preparation of my Annual Report, I have dwelt in detail on many insects that have attracted attention during the year, either by their injuries or benefits. In that Report numerous illustrations will be used to appeal to the eye of the reader, and as it will be published in the same volume with your transactions, I deem it superfluous at the present time to dwell on the natural history of any one insect. Permit me, therefore, to cursorily refer to a few of the prominent entomological events of the year, and afterwards to make a few generalizations, which it is hoped will prove of some little interest and value.

The year 1869 may be set down as one in which our crops, as a general thing, have suffered less than usual from insect depredations. At least such has been the case in Missouri, and, judging from extensive correspondence, the same statement would hold true of most of the northern and middle States of the Union.

True, the Army-worm (*Leucania unipuncta*, Haw.), and the Grain Plant-louse (*Aphis avenæ*, Fabr.), appeared in many parts of the State in sufficient force to do considerable damage, and these two insects may always be expected in a tolerably wet year that was preceded by a very dry one. But most insects, and especially those which afflict you as horticulturists, have behaved exceedingly well, though it is difficult to say whether we are to attribute this good behavior on their part, to the increased knowledge of their habits which has

been disseminated among those who have to deal with them, or to the more potent and unalterable workings of Nature.

The Chinch Bug, which in the dry summer of 1868, committed such ravages upon our grain crops in many portions of our State, and especially in the southwest, was scarcely heard of in 1869, after the copious rains which characterized the past summer commenced to shower down. The Apple Worm, or Codling Moth has been altogether less injurious than it was the year before, and in Adair, Buchanan, Cooper, Callaway, Cass, Lewis and Polk counties, especially, and probably all over the State, our orchards have been loaded with fair fruit. This result was predicted by the writer, and may be attributed principally to the scarcity of the insect, resulting from the partial failure of the apple crop in 1868; but in some part to the improved methods of fighting the foe. For, as in our civil strifes, we introduce improvements in the machinery which is to slay the opposing armies, so in this progressive age, we believe in introducing machinery to battle with our liliputian insect hosts, whenever it is available. And the experience of the past year proves, that to destroy this insect, old pieces of rumpled rag or carpet placed in the crotch of a tree, are to be preferred to the hay-bands wrapped around it, because it requires altogether less time to place the rags in their place than to fasten the hay-band; and the worms which spin up in them can be killed by wholesale, either by scalding the rags or by pressing them through the wringer of a washing machine.

Owing to the severe drouth of 1868, which was unfavorable to its successful transformations, that dreaded foe of the fruit-grower, the Plum Curculio, was scarce in the early part of the season, and our plum and peach trees set a fuller crop than they had done before for years; but the subsequent moist weather was favorable to the underground evolutions of this little pest, and the new brood appeared in great numbers about the end of June and beginning of July, when they did much damage to stone-fruit and some damage to pip-fruit by the gougings which they made for food. As stated in an essay read before the State meeting of our Illinois horticultural friends, I have discovered a little cannibal in the shape of a minute yellow species of *Thrips*, which destroys vast numbers of the "Little Turk's" eggs; and let us hope, that by attacking the Curculio in its most vulnerable point, this *Thrips* may in the course of a few years reduce the numbers of the Curculio, as the ladybirds have done with the Colorado Potato-bug, or as the minute mite (*Acarus mali*) is known to have done with the common Oyster-shell Bark-louse of the Apple. The eggs of the Apple-tree Plant-louse (*Aphis mali*) which last winter so thickly covered the twigs of the apple trees in many orchards, hatched and produced a prodigious number of lice as soon as the buds commenced to burst. In this immediate neighborhood they were soon swept away, however, by their cannibal insect foes, and by insectivorous birds, such as the warblers, etc.; but a physiological

fact connected with this insect has been developed this year by Dr. E. S. Hull, the able Illinois State Horticulturist, which is of such importance that I cannot pass it over even in this brief report. He has ascertained that we suffer from the injurious punctures of their little beaks long after the lice themselves have disappeared. In fact, he has proved to his own satisfaction that the so-called "scab" in apples, which prevailed to such an alarming extent last year, and rendered thousands and thousands of bushels valueless for market purposes, is actually caused by the punctures of these lice. I said that the doctor had proved this matter "to his own satisfaction," because I believe that caution requires that we should not consider it as an established fact until all objections to it can be dispelled. Personally I have made no observations on this matter, but the facts in the case all add weight to Dr. Hull's theory, if such it can be called. Hitherto the cause of the "scab" on apples has been involved in mystery. It was supposed to have a fungoid origin; yet an examination will show that the scabby appearance is not caused by any live fungus, but by arrested growth of the cells which have become corky and cicatrized. The importance of this discovery of Dr. Hull's, should it once be firmly established, cannot well be estimated; for when we have once ascertained the cause of a disease, it need scarcely exist any longer. By destroying the lice we shall prevent scabby apples, and experience teaches that they can be destroyed by a good syringing of tobacco-water. We may expect, in this immediate vicinity, an almost total exemption from "scab" next year, for the apple trees are remarkably free from the minute black bead-like eggs of the Plant-louse with which they were so thoroughly peppered a year ago.

The Tent Caterpillar (*Clisiocampa Americana*) was more abundant than usual in our orchards, and the Tent Caterpillar of the Forest (*Clisiocampa sylvatica*) also appeared in great numbers both on our orchard and forest trees.

A worm which I have called the Pickle Worm, (*Phacellura nitidalis*, Cram.) and which had never been publicly noticed before, appeared in immense numbers, and did great damage to our cucumbers and melons by boring into the fruit, but as this insect, with others, will be fully treated of in my forthcoming Report, I will pass on to a more general subject.

"The pebble in the streamlet scant,
May turn the course of many a river;
The dew-drop on the infant plant,
May warp the giant oak forever."

In no department of science does the old proverb "prevention is better than cure," apply with such force as in that of Economic Entomology. In my studies and observations I have often been struck with the fact that many of our very worst insect enemies have been introduced from abroad, and that if this subject of Economic Entomology had been better understood and appreciated fifty years ago,

and the proper measures had been taken to prevent the introduction of these pests, we should at present be free from the curse of the great majority of them. We have, indeed, plenty of Native American insects, which have become great pests to the cultivator of the soil, on account of the artificial state of things which he induces. In a state of Nature, a given species of plant, in its struggle for existence, is scattered promiscuously over a certain extent of country, and the particular insect or insects which feed upon that plant, have to search for it over a comparatively extensive surface, and their multiplication is consequently restricted. But the pursuit of horticulture, for instance—which may be succinctly defined as the assembling in tracts of greater or less extent, of one species of plant at the expense and exclusion of others—causes the particular insects which feed upon that plant, to multiply unduly, and we have to use that same intelligence in subduing these insects, which we employ in producing the artificial results which caused their increase. In the normal state of things insects never increase unduly; but, on the contrary, always act as Nature's most faithful servants, and accomplish a most important work in her economy. Yet, for reasons explained above, they naturally become our enemies, and we should suffer from the depredations of our indigenous species, even though no foreign ones had been imported. But we have altogether more than our share of these insect depredators, and so truly is this the case, that insects which attract universal attention, and are considered as very serious evils in Europe, would not be deemed worthy of notice in this country. There, if they lose one-fifth of a given crop, the whole community becomes alarmed; but here the cultivator sometimes considers himself fortunate if he secures the half of his crop from insect ravages, and each State loses annually from fifty to sixty million dollars from this cause alone, though but four States have as yet made any attempt to prevent this serious loss. In order to bring this fact home to you, and to show why we suffer more than do our foreign brethren, I will read a paper, which I have prepared for the *American Entomologist*, on

IMPORTED INSECTS AND NATIVE AMERICAN INSECTS.

If we examine into the history, as detailed in a recent number of our Magazine, (pp. 15–22) of the imported Currant Worm and the Native Currant Worm, we shall find a very curious state of things. These two insects both produce Sawflies, which are so closely allied to each other, that although they are referred to distinct genera by Entomologists, it may be doubted whether the genus (*Pristiphora*) under which the native species is classified be not a mere subgenus of that under which the imported species is classified. Reasoning *a priori*, therefore, we should expect to find a very great similarity in the destructive powers of these two worms, especially as each of them infests the leaves both of the Red Currant and of the Gooseberry. But

what are the actual facts? On the one hand we see a Native American species—which must have existed here from time immemorial, feeding on our wild Gooseberries and perhaps on our wild Red Currant, and which yet has troubled our tame Gooseberries and tame Red Currants so very slightly, that it cannot be proved with absolute certainty to have ever done so at all, except in Rock Island county, Ills., and in Scott county, Iowa.*

On the other hand we see a species, only introduced into this country, from Europe, some twelve years ago, which has already almost put a stop to the cultivation of the Gooseberry and Red Currant throughout a large part of the State of New York, the northern borders of Pennsylvania, and the whole of Canada West, and is slowly but surely extending itself in all directions from the point where it was originally imported. What can be the reason of such a wide difference in the noxious powers of two such closely allied insects, feeding on exactly the same plants, but one of them indigenous to America and the other imported into America from Europe? Nor is this the only case of the kind. We can point out at least three other such cases. The Imported Onion-fly (*Anthomyia ceparum*), is a terrible pest to the onion-grower in the East, though it has not yet made its way out West. On the other hand, the Native American Onion-fly (*Ortalis arcuata*, Walker), which is a closely allied species and has almost exactly the same habits, has only been heard of in one or two circumscribed localities in the West, and even there does comparatively but little damage. Again, the Imported Oyster-shell Bark-louse (*Aspidiotus conchiformis*) is a far worse foe to the Apple and certain other fruit trees than our indigenous Harris's Bark-louse, (*Asp. Harrisii*), though each of them infests the same species. Finally, the imported Meal-worm beetle (*Tenebrio molitor*) swarms throughout the whole United States, and is a great pest; while the Native American species (*Tenebrio obscurus*), which has almost exactly the same habits, belongs to the same genus, and is of very nearly the same size, shape and color, is comparatively quite rare among us, and is scarcely known to our millers and flour-dealers.

On a careful and close examination, it will be found that almost all our worst insect foes have been imported among us from the

*In Volume 15 of the *Prairie Farmer*, page 504, a correspondent from Jefferson county, Iowa, states that as early as June 11th, in the year 1865, "a small green worm had taken the lion's share of his currants and gooseberries." This may possibly refer to the Native Currant Worm, which feeds upon gooseberry and currant leaves, but it more probably means the Gooseberry Fruit-worm (*Pempelia grossulariæ*, Packard,) which feeds upon the gooseberries and currants themselves, and which may be found figured and described in our First Missouri Report, page 140. What a vast fund of information is scientifically unavailable, simply because correspondents are so stingy with their pen, ink and paper. Again the editor of the *Farmers' Union*, published at Minneapolis, Minn., says in a recent number of that paper, that several gardens in that vicinity have been for the past few years infested with the Currant worm, and that last year they visited his own garden for the second time, having, the previous year, made sad havoc with the foliage before they were discovered. Now, as there are three perfectly distict worms which attack the leaves of currant bushes, and as the editor contents himself with referring to "THE Currant Worm," the information he imparts is perfectly valueless to the Entomologist, and the practical man may be led astray by the remedies suggested.

other side of the Atlantic. The Hessian Fly* was imported almost ninety years ago; the Wheat Midge about half as long ago; the Bee Moth at the beginning of the present century; the Codling Moth, the Cabbage Tinea, the Borer of the Red Currant, the Oyster-shell Bark-louse, the Grain Plant-louse, the Cabbage Plant-louse, the Currant Plant-louse, the Apple-tree Plant-louse, the Pear-tree Flea-louse, the Cheese-maggot, the common Meal-worm, the Grain Weevil, the House Fly, the Leaf-beetle of the Elm, the Cockroach, the Croton Bug, and the different Carpet, Clothes and Fur Moths, at periods which cannot be definitely fixed. Even within the last few years the Asparagus-beetle has become naturalized in New York and New Jersey, whence it will no doubt spread gradually westward through the whole United States, while the Rape Butterfly was introduced about a dozen years ago, and is rapidly spreading over some of the Eastern States. And only a year ago the larva of a certain Owlet-moth (*Hypogymna dispar*), which is a great pest in Europe, both to fruit-trees and forest-trees, was accidentally introduced by a Massachusetts entomologist into New England, where it is spreading with great rapidity. It is just the same thing with Plants as with Insects. We have looked carefully through Gray's *Manual of Botany*, and we find that—excluding from consideration all cryptogams, and all doubtful cases, and all cases where the same plant is supposed to be indigenous on both sides of the Atlantic—no less than TWO HUNDRED AND THIRTY-THREE distinct species of plants have been imported among us from the Old World, all of which have now run wild here, and many of which are the worst and most pernicious weeds that we have to contend against. In the United States *Agricultural Report* for 1865 (pp. 510–519) will be found a list of ninety-nine of the principal "Weeds of American Agriculture," by the late Dr. Wm. Darlington. Of this whole number no less than forty-three, or nearly one-half, are species that have been introduced among us from the Old World. Among these we may enumerate here, as the best known and the most pernicious, Butter-cups (two species), Shepherd's Purse, St. John's Wort, Cow-cockle, May-weed or Dog-fennel, Ox-eye Daisy, Common Thistle, Canada Thistle, Burdock, Plantain, Mullein, Toad-flax, Bind-weed, Jamestown (Jimson) weed, Lamb's Quarter, Smart-weed, Field Garlic, Fox-tail Grass and the notorious Cheat or Chess. And to these we may add the common Purslane, which, through some strange oversight, has been omitted in Dr. Darlington's catalogue.

It will be supposed, perhaps, since there are about as many voyages made from America to Europe as from Europe to America, that we have fully reciprocated to our transatlantic brethren the favors

*For the sake of the scientific reader, we subjoin here, in their regular order, the scientific names of the insects catalogued by their English names in the text of this paragraph: *Cecidomyia destructor, Diplosis tritici, Galleria cerealis, Carpocapsa pomonella, Plutella cruciferarum, Ægeria tipuliformis, Aspidiotus conchiformis, Aphis avenæ, A. brassicæ, A. ribis, A. mali, Psylla pyri, Piophila casei, Tenebrio molitor, Sitophilus granarius, Musca domestica, Galeruca calmariensis, Blatta orientalis, Ectobia germanica, Tinea tapetzella, vestianella, pellionella, &c.; Crioceris asparagi, Pieris rapæ and Hypogymna dispar.*

which they have conferred upon us, in the way of Noxious Insects and Noxious Weeds. It is no such thing. There are but very few American insects that have become naturalized in Europe, and even these do not appear for the most part to do any serious amount of damage there. For example, on one or two occasions single specimens of our Army-worm Moth (*Leucania unipuncta*) have been captured in England; but the insect has never spread and become ruinously common there, as it continually, in particular seasons, does in America. Our destructive Pea-bug (*Bruchus pisi*) has also found its way to Europe; but although it is met with in England, and according to Curtis has become naturalized in the warmer departments of France, Kirby and Spence expressly state that it does not occur in England "to any very injurious extent," and Curtis seems to doubt the fact of its being naturalized in England at all.* Again, the only species of White Ant that exists within the limits of the United States, (*Termes frontalis*), has been known for a long time to be a guest at the Plant-houses of Schönbrunn, in Germany; but is not recorded to have ever as yet spread into the surrounding country. As to our American Meal-worm (*Tenebrio obscurus*), Curtis states that it has been introduced into England along with American flour, and that it is sometimes abundant in London and the provinces;† but Kirby and Spence say not one word about it, and it seems to be confined to the English sea-ports and the places where American flour is stored, without spreading into the adjacent districts.

A very minute yellow ant, however, (*Myrmica molesta*), which is often very troublesome with us in houses, has, according to Frederick Smith, "become generally distributed and naturalized" in houses in England; and Kirby and Spence state more specifically, that "it has become a great pest in many houses in Brighton, London and Liverpool, in some cases to so great an extent as to cause the occupants to leave them."‡ As to our Chinch Bug, our Curculio, our Plum Gouger, our two principal Apple-tree Borers, our Canker-worm, our Apple-tree Tent-caterpillar, our Fall Web-worm, our Peach-tree Borer, and our other indigenous pests among the great Army of Bad Bugs, nobody ever yet found a single one of them alive and kicking on the other side of the Atlantic. And with regard to Plants, the only two American plants that we know to have become so firmly established in Europe as to be a nuisance there, are an American aquatic plant, the common Water-weed (*Anacharis canadensis*), which has choked up many of the canals in England, and our common Horse-weed, or Mare's tail as it is called in the West, (*Erigeron canadense*), which has spread from America nearly over the whole world.

Since then, it can be demonstrated by hard, dry facts, that American plants and insects do not become naturalized in the Old World

*Kirby & Spence *Introd.* Letter 6th; Curtis *Farm insects*, p. 358.

†*Farm insects*, p 334.

‡Smith in Stainton's *Entom. Annual* 1862, p. 70, and 1863 pp. 59-62; Kirby & Spence *Introd.*, Letter 8th.

with anything like the facility with which the plants and insects of the Old World are every day being naturalized in America, there must be some cause or other for this singular state of things. What is that cause? It is, as we believe, a simple fact which is pretty generally recognized now as true by modern naturalists, namely, that the plants and animals of America belong, as a general rule, to an old-fashioned creation, not so highly improved and developed as the more modernized creation which exists in Europe. In other words, although this is popularly known as the New World, it is in reality a much older world than that which we are accustomed to call the Old World. Consequently, our plants and animals can no more stand their ground against European competitors imported from abroad, than the Red Indian has been able to stand his ground against the White Caucasian Race. On the other hand, if by chance an American plant or an American animal finds its way into Europe, it can, as a general rule, no more stand its ground there against its European competitors, than a colony of Red Indians could stand their ground in England, even if you gave them a whole county of land and an ample supply of stock, tools, and provisions to begin with. For throughout Animated Nature, as has been conclusively shown by Charles Darwin, there is a continual struggle for existence, the stronger and more favorably organized species overpowering and starving out from time to time their less vigorous and less favorably organized competitors. Hence, it is as hopeless a task for a poor puny, old-fashioned American bug to contend against a strong energetic, highly-developed, European bug, as it would be for a fleet of old-fashioned wooden ships to fight against a fleet of our modern iron-clads.

Let not "Young America," however, be altogether discouraged and disgusted at hearing, that our Animal and Vegetable Creation is more old-fashioned than that of what is commonly known as the Old World. The oldest geological formations, in which the remains of Mammals occur, contain the remains of such mammals exclusively (*Marsupialea*) as bring forth their young only partially developed, and carry those young about with them in a pouch, till the day of complete development and physical "second birth" arrives. In America we have a single genus—the Opossums—that belongs to this antediluvian type. In the three ancient continents they have absolutely none at all. But if in this respect America is more old-fashioned than Europe, Australia is still more old-fashioned than America; for there almost all their mammals possess this remarkable peculiarity; so that if the American creation is somewhat old-fogyish, that of Australia is the very concentrated essence of old-fogyism itself. Consequently, if Europe crows over us as altogether "behind the times," "Young America" can take its revenge by crowing over Australia, as the land of the Kangaroo and the Wombat and other such exploded absurdities of the Mesozoic epoch.

The theory advanced in the above paper, may meet with some objectors, although I confidently believe in the inference there stated of the relative advancement and improvement of the flora and fauna of the two continents. But there is another reason why the insects which are imported into this country multiply at a prodigious rate, and soon acquire herculean power of doing harm, though they may never have stepped beyond the limits of propriety in their own native home—a reason too palpable and evident to savor of the theoretical. It is, that whenever an injurious insect is introduced in our midst, as a general rule the particular parasite or parasites which kept it in check abroad, are not introduced with it. In consequence, the foreigners, unaccompanied by the usual *gens d'armes*, throw off all restraint and play the deuce with our crops; just as the rats and mice will take possession of, and overrun a house, if not restrained by human or by feline agencies.

Sometimes, as in the case of the Imported Currant-worm, the noxious insects introduced from the old world are attacked by native American parasites, but as I believe the parasites of European nativity to be, as a rule, more energetic and vigorous than our indigenous ones, it would be advisable even in such a case, to import in addition such species as prey upon it in Europe. But in the case of the Wheat Midge which has actually flourished among us for almost half a century without a single parasite of any kind whatever infesting it from one end of the country to the other, it is sheer folly and cupable shiftlessness not to import among us from the other side of the Atlantic some one or all of the three different *Chalcis* flies which are known to check it throughout all Europe. And so with other insects which are known to be unaccompanied with the parasites which attack them abroad. Years and years ago Dr. Fitch demonstrated in print the policy of such a step; but bugs and bug-hunters are so very generally the subject of festive ridicule among the high and low vulgar, that hitherto the recommendation of the State Entomologist of New York has met with no practical response.

Now no one will fail to understand the force of the old proverb already quoted, after listening to these facts. Let us profit by the experience of the past, and while battling with those foes which are already in our midst, let us keep a watchful eye, and be on our guard ready to crush any new plague that may threaten us, before it gets beyond control. Yes, but say you, how is this to be accomplished? Can it be done by the government? Yes, in some cases; as for instance in the importation of parasites, government aid should be solicited. If, in 1860, when the Asparagus Beetle (*Crioceris asparagi*, Linn.) was first introduced on to Long Island, the Legislature of the State of New York had taken proper action in the matter, the insect might have been stamped out of the island at the trivial expense of a few hundred dollars, instead of being allowed to multiply, as it did, to such an extent as to occasion a dead loss of some fifty thousand

dollars in a single county, and of spreading from the island into the adjoining country. Quite recently a weevil (*Bruchus granarius*) which does immense damage to peas and beans and some other plants in Europe, was introduced into New York in some pods which a certain gentleman presented to the New York Farmers' Club, and if the proper steps are at once taken, it may yet be prevented from spreading through the country.

In Europe vast sums have been expended in founding professorships of Economic Entomology in the various agricultural colleges, and in conducting elaborate experiments on the best means of checking and controlling these tiny foes. But the entire sum expended by Congress or by our various State Legislatures for this purpose, from the Declaration of Independence to the year of our Lord 1869, cannot exceed ninety or one hundred thousand dollars, or about one thousand dollars a year. Yet the annual damage done by insects within the limits of the United States cannot be less than three hundred million dollars. Indeed, it is but quite recently that the people, from necessity, have awakened to the importance of the subject. We now have an Entomologist connected with the Department of Agriculture at Washington, and, with proper care, he can be of inestimable service to the country, in preventing the introduction of noxious insects. It is not noxious weeds alone, such as the Canada thistle, which are sent broadcast over the land by the distribution of uninspected seeds; but noxious insects are very frequently distributed in the same way. We have the highest authority, Dr. J. L. LeConte, of Philadelphia, for the statement, that before the Entomologist received his appointment, a noxious beetle, *Rhizopertha pusilla*, which has now become naturalized here, was originally introduced into this country in wheat from the Patent Office.

Therefore, there can be no doubt that much may be done at headquarters. That government aid cannot be of any avail in the great majority of instances, however, is equally apparent to those who have studied this question; and we must trust to a more thorough dissemination of such information as will enable each individual to protect himself. Much is being done in this direction by means of State Reports, through the *American Entomologist*, and through our various agricultural and horticultural journals; but much yet remains to be done. We must bear in mind that by enlightening our neighbors, we are helping ourselves, and, as horticulturists, we should urge that more attention be paid in our colleges, and especially in those of an Industrial nature, to the study of the Natural Sciences.

In my First Report, I have shown how the Oyster-shell Bark-louse, though perfectly able to live in the northern part of this State, is yet unknown there; and I tremble, lest some one in carelessness or ignorance should, introduce this dreaded plague of the apple grower into that section, from some Eastern or Northern nursery. Every

tree received from a distance should be examined from "top to stern," as the sailors say, before it is planted, and all insects, in whatever state they may be, destroyed. There can be do doubt that many of our worst insect foes may be guarded against by these precautions. The Canker-worm, the different Tussock-moths or Vaporer-moths, the Bark-lice of the Apple and of the Pine, and all other scale insects (*Coccidæ*), the Apple-tree Root-louse, etc., are continually being transported from one place to another, either in earth, on scions, or on the roots, branches, and leaves of young trees; and they are all possessed of such limited powers of locomotion, that unless transported in some such manner, they would scarcely spread a dozen miles in a century.

In the Pacific States, fruit-growing is a most profitable business, because they are yet free from many of the fruit insects which so increase our labors here. In the language of our late lamented Walsh, "although in California the Blest, the Chinese immigrants have already erected their joss houses, where they can worship Buddha without fear of interruption, yet no 'Little Turk' has imprinted the crescent symbol of Mahometanism upon the the Californian plums and the Californian peaches." But how long the Californians will retain this immunity, now that they have such direct communication with infested States, will depend very much on how soon they are warned of their danger. I suggest to our Pacific friends that they had better "take the bull by the horns," and endeavor to retain the vantage ground they now enjoy. I also sincerely hope that the day will soon come when there shall be a sufficient knowledge of this subject throughout the land, to enable the nation to guard against foreign insect plagues; the State against those of other States, and the individual against those of his neighbors.

THE CHINCH BUG—*Micropus leucopterus*, Say.

(Heteroptera, Lygæidæ.)

[Fig. 1.]

a I

Few persons will need to be introduced to this unsavory little scamp, but, lest perchance, an occasional reader may not yet have a clear and correct idea of the meaning of the word Chinch Bug, I represent herewith (Fig. 1) a magnified view of the gentleman. The hair-line at the bottom shows the natural size of the little imp, and his colors are coal-black and snow-white. He belongs to the order of Half-winged Bugs (HETEROPTERA), the same order to which the well known Bed Bug belongs, and he exhales the same loathsome smell as does that bed-pest of the human race. He subsists by sucking, with his sharp-pointed

beak, the juices of our cereals, thereby causing them to shrink and wither, and not by gnawing or biting their substance, as many persons suppose. Insignificant as is the minute puncture of a single individual, yet these insects often appear in such countless numbers as to bleed to death whole fields of grain by their myriad beaks.

If the Western Fruit-grower is asked, what particular insect is the most difficult for him to combat, and the most destructive to his crops, he will probably answer "The Curculio." If the same question is put to the Western Grain-grower, he will infallibly reply "The Chinch Bug." And he will be in the right. The Wheat-midge—popularly known in the West as the "Weevil" or the "Red Weevil"—does a considerable amount of damage, in particular years and in particular localities, by its little legless orange-colored lava sucking away the sap from the growing kernel of wheat. The Hessian Fly—often called simply "the Fly"—injures the wheat by the maggot that produces it living between the stem and the sheath of the blade, and intercepting the sap before that sap can reach the ear. The Grain Plant-louse, easily distinguished from the above two little pests by its long sprawling legs, has in certain years somewhat injured the small grain in the West by accumulating, first on the growing stem and afterwards on the ear, and abstracting the sap with its long pointed beak. There are also, in all probability, several minute Two-winged Flies, which do more or less injury to the growing grain by their larvæ breeding in the stem, the natural history of one of which, the American Meromyza, was given for the first time in my First Report (pp. 159–61). The larva of an unknown moth, which burrows upwards and downwards in the stem of oats, and probably of wheat also, causing the ear to become prematurely white and the kernel to be entirely blasted, also in some years does considerable damage. The White Grub, the Wire-worm, and certain Cut-worms take a certain per centage of the young grain, almost as soon as it peeps out of the ground. But undoubtedly the meanest bug, out of the whole crowd of the multifarious insect-foes of the grain-growing farmer, is the Chinch Bug. He is not satisfied with taking a field here and a field there, and sparing the remainder. But when his time comes—and in mercy to the Western Farmer we are not cursed every year with this little savage—he sweeps the whole country with the besom of destruction. The Wheat-midge, the Hessian Fly, and the Grain Plant-louse, destructive as they are to small grain, yet spare our corn. If they take the good white wheaten bread out of our mouths, they yet leave us an ample supply of corn-dodgers. But the Chinch Bug makes a clean sweep, whenever he gets the upper hand of us. He "goes the entire hog." Nothing in the way of grain comes amiss to him. He is not dainty, not he! Whenever he gets a chance to spread himself, he first of all at one fell swoop destroys the small grain, and then fastens his liquorish beak upon the corn and takes that also.

PAST HISTORY OF THE CHINCH BUG.

The first record we have of the prevalence of the Chinch Bug was in the old Revolutionary times in North Carolina, where it was confounded with the Hessian Fly, an insect just then imported from Europe into the United States. Ever since those times it has been an epidemic pest, in particular years, in North and South Carolina and in Virginia. The great American entomologist, Thomas Say, in 1831, when he had been residing in Indiana for six years, was the first to name and describe it scientifically. He states that he "took a single specimen on the Eastern shore of Virginia;" whence we may reasonably infer that it was then either unknown or very rare in Indiana, and probably also in the other Western States. In Missouri it did considerable damage as early as 1854, for Jas. Pleasant of Fox Creek, St. Louis county, informed me that he had known it since that year, and that he had been previously acquainted with it in Virginia. Wm. M. Beal of Edina, Knox county, writes that it has existed and done more or less damage there since 1856, though it has scarcely been heard of since 1865. Mr. A. H. Roberts of Gray's Summit, Franklin county, informs me that it has not been in that neighborhood more than eight or ten years, and Mr. C. S. Jeffries, of Boles' post office in the same county, never heard of it till about fifteen years ago, though he has lived there for the last fifty years.

If proper records existed, we should doubtless find that it attracted attention in Missouri at a much earlier day, for in Illinois it was noticed as long back as 1840, in Hancock county, where it was absurdly supposed to have been introduced by the Mormons of Nauvoo, and was called the "Mormon louse"

In 1868, owing to the great drouth, this insect, as I have stated elsewhere, was quite injurious in many sections of our own State, and especially in the southwest. In the extreme northern portion they began to attract attention about the first of May, but the wet weather that occurred about that time caused them to disappear. In the more central counties the earliest sown wheat suffered but little from their depredations, though that which was sown later, was reduced about one-third. The conditions being favorable, they rapidly increased during the Summer, and in the fall, the second brood was so numerous that great fears were entertained for the safety of the crops of 1869. Let us be thankful, however, that the excessive rains of last spring and summer, though deplored and regretted by many, had the effect to so thoroughly drown out these little pests, as to make them comparatively harmless; for the only place in which I heard of their doing serious harm was at Tinney's Grove in Ray county. Seeming misfortune is often a blessing in disguise, and though the corn crop was lessened by the heavy rains, the wheat crop in all probability would have suffered far worse, had the season

been dry and favorable to the increase of this, the greatest insect foe of the wheat-grower.

We may safely conclude that the Chinch Bug has always existed in Missouri, in small numbers; but that it did not multiply to an injurious extent until the grains began to be cultivated on an extensive scale. At all events, we know from the evidence of Dr. Harris and Dr. Fitch, that it existed long ago in exceedingly small numbers in New York, and even in Massachusetts. What the causes may have been, that thinned out the numbers of this insect in former times in the West, is another question. In former times, the great bulk of these bugs were probably destroyed every winter by the prairie fires, and, as cultivation has extended in consequence of the country being gradually settled up, and less and less prairie has been annually burnt over, the number that has survived through the winter to start the next year's broods has annually become greater. If these views be correct, we may expect them, unless more pains be taken to counterwork and destroy them, to become, on the average of years, still more abundant than they now are, whenever prairie fires shall have become an obsolete institution; until at last Western farmers will be compelled, as those of North Carolina have already several times been compelled, to quit growing wheat altogether for a term of years.

It may be very reasonably asked, why the Chinch Bug does not increase and multiply in Massachusetts and New York, seeing that it existed there long ago, and that there are, of course, no prairie fires in those States to keep it in check. The answer is, that the Chinch Bug is a Southern, not a Northern species; and that hundreds of Southern species of insects, which on the Atlantic seaboard only occur in southerly latitudes, are found in profusion in quite a high latitude in the Valley of the Mississippi. The same law, as has been observed by Professor Baird, holds good both with Birds and with Fishes.*

NATURAL HISTORY OF THE CHINCH BUG.

In the four great and extensive Orders of Insects, namely, the Beetles (*Coleoptera*), the Clear-winged Flies (*Hymenoptera*), the Scaly-winged Flies (*Lepidoptera*), and the Two-winged Flies (*Diptera*), and in one of the four small Orders in its restricted sense, namely, the Net-winged Flies (*Neuroptera*), the insect usually lies still throughout the pupa state, and is always so far from being able to eat or to evacuate, that both mouth and anus are closed up by membrane. In the remaining three small Orders, on the contrary, namely, that of the Straight-winged Flies in its most extensive sense (*Orthoptera* including *Pseudo-neuroptera*), the Half-winged Bugs (*Heteroptera*) and the Whole-winged Bugs (*Homoptera*), the pupa is just as active and just as ravenous as either the larva or the perfect

* Silliman's Journal, xli, p. 87.

insect, and the little creature never quits eating as long as the warm weather lasts, except for a day or so while it is accomplishing each of its successive three, four or five moults. As the Chinch Bug belongs to the Half-winged Bugs, it therefore continues to take food, with a few short intermissions, from the day when it hatches out from the egg to the day of its unlamented death.

Most insects—irrespective of the Order to which they belong—require 12 months to go through the complete circle of their changes, from the day that the egg is laid to the day when the perfect insect perishes of old age and decrepitude. A few require 3 years, as for example the Round-headed Apple-tree Borer (*Saperda bivittata*, Say) and the White Grub which produces the May-beetle (*Lachnosterna quercina*, Knoch.). One species, the Thirteen-year Locust (*Cicada tredecim*, Riley), actually requires 13 years to pass from the egg to the winged state; and another, the Seventeen-year Locust (*Cicada septemdecim*, Linn.) the still longer period of 17 years. On the other hand there are not a few that pass through all their three states in a few months, or even in a few weeks; so that in one and the same year there may be 2, 3 or even 4 or 5 broods, one generated by the other and one succeeding another. For example, the Hessian Fly (*Cecidomyia destructor*, Say), the common Slug-worm of the Pear (*Selandria cerasi*, Peck), the Slug-worm of the Rose (*Selandria rosæ* Harris), the Apple-worm and a few others, produce exactly two generations in one year, and hence may be termed "two-brooded." Again, the Colorado Potato-beetle in Central Missouri is three-brooded, and not improbably in more southerly regions is four-brooded. Lastly, the common House-fly, the Cheese-fly, the various species of Blow-flies and Meat-flies, and the multifarious species of Plant-lice (*Aphis*) produce an indefinite number of successive broods in a single year, sometimes amounting in the case of the last-named genus, as has been proved by actual experiment, to as many as nine.

As long ago as March, 1866, I published the fact that the Chinch Bug is two-brooded in North Illinois (*Practical Entomologist*, I, p. 48), and I find that it is likewise two-brooded in this State. and most probably in all the Middle States. Yet it is quite agreeable to analogy that in the more Southern States, it may be three-brooded. For instance, the large Polyphemus Moth is single-brooded in the Northern and Middle States, and yet, two broods are sometimes produced in this State, while in the South it is habitually two-brooded. Again, the moth known as the Poplar Spinner, (*Clostera Americana*, Harris), is stated by Dr. Harris and Dr. Fitch to be only single-brooded in Massachusetts and New York, the insect spinning up in September or October, passing the winter in the pupa state, and coming out in the winged form in the following June. But Dr. Harris—no doubt on the authority of Abbott—states that "in Georgia this insect breeds twice a year;"* and I have proved that it does so breed in Missouri, having

*Injurious Insects, p. 434.

now (Dec. '69) a number of cocoons which were formed by a second brood of larvæ. It is quite reasonable, therefore, to infer that the Chinch Bug may produce even more than two broods in the more Southern States.

It is these two peculiarities in the habits of the Chinch Bug, namely, first, its continuing to take food from the day of its birth to the day of its death, and secondly, its being either two-brooded or many-brooded, that renders it so destructive and so difficult to combat. Such as survive the autumn, when the plants on the sap of which they feed are mostly dried up so as to afford them little or no nourishment, pass the winter in the usual torpid state, and always in the perfect or winged form, under dead leaves, under sticks of wood, under flat stones, in moss, in bunches of old dead grass or weeds or straw, and often in corn-stalks and corn-shucks. In the fall and winter of 1868, I repeatedly received corn-stalks that were crowded with them, and it was difficult to find a stalk in any field that did not reveal some of them, upon stripping off the leaves. I have even found them wintering in the gall made by the Solidago Gall-moth (*Gelechia gallæsolidaginis*), described in the First Report.

In the winter all kinds of insect-devouring animals, such as birds, shrew-mice, etc., are hard put to it for food, and have to search every hole and corner for their appropriate prey. But no matter how closely they may thin out the Chinch Bugs, or how generally these insects may have been starved out by the autumnal droughts, there will always be a few left for seed next year. Suppose that there are only 2,000 Chinch Bugs remaining in the spring in a certain field, and that each female of the 2,000, as vegetation starts, raises a family of only 200, which is a low calculation. Then—allowing the sexes to be equal in number, whereas in reality the females are always far more numerous than the males—the first or spring brood will consist of 200,000, of which number 100,000 will be females. Here, if the species were single-brooded, the process would stop for the current year; and 200,000 Chinch Bugs in one field would be thought nothing of by the Western farmer. But the species is NOT single-brooded and the process does NOT stop here. Each successive brood increases in numbers in Geometrical Progression, unless there be something to check their increase; until the second brood amounts to twenty millions, and the third brood to two thousand millions. We may form some idea of the meaning of two thousand millions of Chinch Bugs, when it is stated that that number of them, placed in a straight line head and tail together, would just about reach from the surface of the earth to its central point—a distance of four thousand miles.

According to the reasoning of Dr. Henry Shimer, of Mr. Carroll, Illinois, who published an interesting paper on this insect in the proceedings of the Academy of Natural Science of Philadelphia for May, 1867, the Chinch Bug takes wing only at its love seasons, which occur in his locality in May and in August. His views on this subject are

well set forth in the following paragraph taken from the paper above alluded to:

May 16, 1865, was a delightful, mild, bright, sunny, summer-like day: and I again, for the last time, observed the same highly interesting phenomena, which I have noticed above as occurring after the harvest of 1864—the atmosphere swarming with Chinch Bugs on the wing. This is their spring; that was their autumnal nuptial season—their season of love. These remarkable little creatures prefer to conduct their courtships under the searching gaze of the noonday sun, instead of at the midnight hour. They were so numerous, alighting on the pavements in the village, that scarcely a step could be taken without crushing many of them under foot. In a few days, they had all disappeared; their breeding grounds were chosen, where they could be found in great numbers, often in pairs. I first noticed this disposition of the Chinch Bug to take wing under the promptings of the love passion, about six years ago, in their autumnal love season. At no other time save their love season, twice a year, have I ever seen one Chinch Bug flying. It is quite remarkable that the winged imago, under no other circumstances will even attempt to use its ample wings. No threatening danger, however imminent, whether of being driven over by grain reapers, wagons, or of being trodden under foot, etc., will prompt it to use its wings to escape. I have tried all imaginable ways to induce them to fly, as by threshing among them with bundles of rods or grass, by gathering them up and letting them fall from a height, etc., but they invariably refuse entirely to attempt to use their wings in escaping from danger. The love emotion alone makes them conscious that they are in possession of wings.

I agree entirely with Dr. Shimer as to the facts mentioned in the paragraph, but not as to the conclusions which he deduces. There are many objections to his theory, some of which may be found in the *American Entomologist*, (Vol. I, pp. 172–3).

It is a notorious fact that Chinch Bugs do not all mature at once, and if they took wing only when making their courtships, some of them would be flying during a period of several weeks; and as will be shown presently, there exists a dimorphous short-winged form of the Chinch Bug, which cannot possibly make any such ærial love trips. It seems more agreeable to analogy that they take wing only when they have become so unduly numerous that they are instinctively aware that they must either emigrate or starve. Be this however as it may, the fact of their being as a general rule unwilling to use their wings is well known to every practical farmer.

It has long been known that the Chinch Bug deposits its eggs underground and upon the roots of the plants which it infests, and that the young larvæ remain underground for some considerable time after they hatch out, sucking the sap from the roots. If, in the spring of the year, you pull up a wheat plant in a field badly infested by this insect, you will find hundreds of the eggs attached to the roots; and at a somewhat later period the young larvæ may be found clustering upon the roots and looking like so many moving little red atoms. The egg is so small as to be scarcely visible to the naked eye, of an oval shape, about four times as long as wide, of a pale amber white

color when first laid, but subsequently assuming a reddish color from the young larva showing through the transparent shell.* As the mother Chinch Bug has to work her way underground in the spring of the year, in order to get at the roots upon which she proposes to lay her eggs, it becomes evident at once, that the looser the soil is at this time of the year the greater the facilities which are offered for the operation. Hence the great advantage of ploughing land for spring grain in the preceding autumn, or, if ploughed in the spring, rolling it repeatedly with a heavy roller after seeding. And hence the remark frequently made by farmers, that wheat harrowed in upon old corn-ground, without any ploughing at all, is far less infested by Chinch Bug than wheat put in upon land that has been ploughed. There is another fact which has been repeatedly noticed by practical men. This insect cannot live and thrive and multiply in land that is sopping with water; and it generally commences its operations in early spring upon those particular parts of every field where the soil is the loosest and the driest.

The female occupies about three weeks in depositing her eggs, and, according to Dr. Shimer's estimate, she deposits about 500. The egg requires about two weeks to hatch, and the bug becomes full grown and acquires its wings in from 40 to 50 days after hatching.

[Fig. 2.]

There are, as is well known to Entomologists, many genera of the Half-winged Bugs, which in Europe occur in two distinct or "dimorphous" forms, with no intermediate grades between the two; namely, a short-winged or sometimes even a completely wingless type and a long-winged type. Frequently the two occur promiscuously together, and are found promiscuously copulating so that they cannot possibly be distinct species. Sometimes the long-winged type occurs in particular seasons and especially in very hot seasons. More rarely the short-winged type occurs in a different locality from the long-winged type, and usually in that case in a more northerly locality. We have a good illustration of this latter peculiarity in the case of the Chinch Bug, for a dimorphous short-winged form (Fig. 2.) occurs in Canada, and Dr. Fitch describes it from specimens received from the States, as a variety, under the name of *apterus*.

DESTRUCTIVE POWERS OF THE CHINCH BUG.

Few persons in the more Northern States can form a just conception of the prodigious numbers and redoubtable armies in which this insect is sometimes seen in the South and Southwestern States,

*In Dr. Shimer's Paper the dimensions of the egg, as "determined with fine mathematical instruments," are said to be "0.04 inch long and 0.01 inch wide," (p. 99.) This is either a clerical or a typographical error for "0.004 inch long and 0.001 inch wide." Otherwise the egg would be nearly one-third as long as the insect itself; and as Dr. Shimer thinks that every female lays about 500 eggs, this would be something like getting a bushel of wheat out of a quart measure.

marching from one field to another. The following extracts—the first one written in June, 1865, by Dan. F. Rogers to the New York Farmers' Club, and the second from an old number of the *Prairie Farmer*—may seem a little far-fetched, but I have no doubt that both accounts are substantially correct:

There never was a better "show" for wheat and barley than we had here the 10th of June, and no more paltry crop has been harvested since we were a town. Many farmers did not get their seed. In passing by a field of barley where the Chinch Bugs had been at work for a week, I found them moving in solid column across the road to a corn field on the opposite side, in such numbers that I felt almost afraid to ride my horse among them. The road and fences were alive with them. Some teams were at work mending the road at this spot, and the bugs covered men, horses and scrapers till they were forced to quit work for the day. The bugs took ten acres of that corn, clean to the ground, before its hardening stalks—being too much for their tools—checked their progress. Another lot of them came from a wheat field adjoining my farm into a piece of corn, stopping now and then for a bite, but not long. Then they crossed a meadow 30 rods into a 16-acre lot of sorgo, and swept it like a fire, though the cane was then scarce in tassel. From wheat to sorgo was at least sixty rods. Their march was governed by no discoverable law, except that they were infernally hungry, and went where there was most to eat. *Helping a neighbor harvest* one of the few fortunate fields, early sown—and so lucky!—we found them moving across his premises in such numbers that they bid fair to drive out the family. House, crib, stable, well-curb, trees, garden fences—one *creeping* mass of stinking life. In the house as well as outside, like the lice of Egypt, they were everywhere; but in a single day they were gone.

If any Western rustics are verdant enough to suppose that Chinch Bugs cannot be out-flanked, headed off and conquered, they are entirely behind the times. The thing has been effectually done during the past season, by Mr. Davis, Supervisor of the town of Scott, Ogle county, Ills. This gentleman had a cornfield of a hundred acres, growing alongside of an extensive field of small grain. The bugs had finished up the latter and were preparing to attack the former, when the owner, being of an ingenious turn, hit upon a happy plan for circumventing them. He surrounding the corn with a barrier of pine boards set up edgewise, and partly buried in the ground, to keep them in position. Outside of this fence deep holes were dug, about ten feet apart. The upper edge of the board was kept constantly moist with a coat of coal tar, which was renewed every day.

The bugs, according to their regular tactics, advanced to the assault in solid columns, swarming by millions, and hiding the ground. They easily ascended the boards, but were unable to cross the belt of the coal tar. Sometimes they crowded upon one another so as to bridge over the barrier, but such places were immediately covered with a new coating. The invaders were in a worse quandary than that of Butler and Weitzel at Fort Fisher, and, in that state of mind crept backward and forward until they tumbled into the deep hole aforesaid. These were soon filled, and the swarming myriads were shoveled out of them literally by wagon loads, at the rate of thirty or forty bushels a day—and buried up in other holes, dug for the purpose, as required. This may seem incredible to persons unacquainted with this little pest, but no one who has seen the countless myriads which cover the earth as harvest approaches, will feel

inclined to dispute the statement. It is an unimpeachable fact. The process was repeated till only three or four bushels could be shovelled out of the holes, when it was abandoned. The corn was completely protected, and yielded bountifully.

HEAVY RAINS DESTRUCTIVE TO THE CHINCH BUG.

As the Chinch Bug, unlike most other true Bugs, deposits its eggs underground, and as the young larvæ live there for a considerable time, it must be manifest that heavy soaking rains will have a tendency to drown them out. The simple fact, long ago observed and recorded by practical men, such as Mr. B. E. Fleharty of North Prairie, Knox county, Ills., that this insect scrupulously avoids wet land. proves that moisture is naturally injurious to its constitution. Hence it was many years ago remarked by intelligent farmers, and we had an illustration of it the present year (1869), that very often when the spring opens dry, Chinch Bugs will begin to increase and multiply in an alarming manner; but that the very first heavy shower checks them up immediately, and repeated heavy rains put an almost entire stop to their operations. It is very true that nearly all insects will bear immersion under water for many hours, and frequently for a whole day, without suffering death therefrom; for although animation is apparently suspended in such cases, they yet, as the phase is, "come to life again." But no insect, except the few that are provided with gills like fishes and extract the air out of the water, instead of breathing it at first hand, can stand a prolonged immersion in water without drowning. And it must be obvious to the meanest capacity, that an insect, such as the Chinch Bug, whose natural home is the driest soil it can find, will have its health injuriously affected by a prolonged residence in a wet soil.

In fact the whole history of the Chinch Bug, from the very earliest records which we have of it, points unmistakably to the fact that a wet season affects it injuriously, and often almost annihilates it. In Carolina and Virginia, during the dry years which preceded 1840, it had become so numerous that the total destruction of the crops was threatened; but fortunately, unlike its predecessors, the summer of 1840 was quite wet and the ravages of the bug were at once arrested. In Illinois and in this State it had increased to an alarming extent during the latter part of the late Rebellion; but the excessive wet summer of 1865 swept them away to such an extent that it was difficult to find any in the fall of that year. So it was again in 1869-70, and so it always has been, and doubtless always will be. It will be well therefore for farmers to bear in mind, that *in a hot, dry season Chinch Bugs are always the worst, and that in a wet season it is impossible for them to do any considerable amount of damage.*

Dr. Shimer, however, is not satisfied with this simple theory. He has gotten up and expounded to the world a new and recondite theory of his own, namely, that in the terrible wet season of 1865, when the Chinch Bug, although in early spring it had appeared in

very great numbers, was almost annihilated in the course of the summer, it perished, not as others had foolishly supposed, from the direct operation of the rain, but indirectly through a certain mysterious epidemic disease analogous to the Cholera or the Yellow Fever among human beings. He fully allows that the mortality among the Chinch Bugs was contemporaneous with the wet weather; but he will have it that it was not the wet weather that killed the Bug, as we common folks have always hitherto believed, but that it was his newly-discovered Epidemic Disease. But as in the conjoint article in the *American Entomologist* (I, pp. 174–6) this Epidemic theory was fully considered by my late associate, Mr. Walsh, in his own peculiar style, I shall not dwell upon it here.

CANNIBAL FOES OF THE CHINCH BUG.

As long ago as 1861, Mr. Walsh, in his *Essay upon the Injurious Insects of Illinois*, published facts which tended to show that four distinct species of Ladybirds preyed upon the Chinch Bug.* The first of these four is the Spotted Ladybird (*Hippodamia maculata*, DeGeer, Fig. 3), which also preys upon a great variety of other insects, attacking both the eggs of the Colorado Potato Bug and those of certain Bark-lice; and which is further remarkable for being one of the few insects found both in Europe and in North America.

[Fig. 3.]

[Fig. 4.]

In corroboration of the fact of its preying on the Chinch Bug, I may state, that the Rev. Chas. Peabody, of Sulphur Springs, informs me that he has repeatedly found it so feeding on his farm. The second species is the Trim Ladybird (*Coccinella munda*, Say, Fig. 4), which is distinguishable at once from a great variety of its brethren by having no black spots upon its red wing-cases. The other two are much smaller insects, belonging to a genus (*Scymnus*) of Ladybirds, most of the species of which are quite small and of obscure brown colors, and hard to be distinguished by the popular eye from other beetles, the structure of which is very different, and which therefore belong to very different groups and have very different habits.

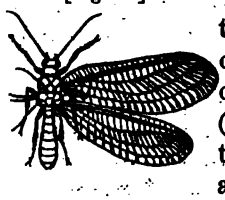
In the autumn of 1864 Dr. Shimer ascertained that the Spotted Ladybird which has been sketched above, preys extensively upon the Chinch Bug. In a particular field of corn, which had been sown thick for fodder, and which was swarming with Chinch Bugs, he found, as he says, that this Ladybird, "could be counted by hundreds upon every square yard of ground after shaking the corn; but the Chinch Bugs were so numerous that these hosts of enemies made very little perceptible impression among them."

In the same autumn Dr. Shimer made the additional discovery, that in the very same field of fodder-corn the Chinch Bugs were preyed upon by a very common species of Lacewing-fly, which he

*See *Trans. Ill. St. Agric. Society*, IV, pp. 346–9.

described in January, 1865,* as the Illinois Lacewing (*Chrysopa Illinoiensis*). The description was republished, together with the substance of Mr. Shimer's observations in the *Prairie Farmer*, of Chicago, Ill., accompanied with a non-characteristic wood-cut of the larva, cocoon and imago. At this time Mr. Shimer favored me with two specimens of the perfect insect, and he likewise furnished Mr. Walsh with additional specimens. From these specimens, it is evident that the species is the same as that described long before, by Dr. Fitch, as the Weeping Lacewing (*Chrysopa plorabunda*). In 1868, I found the same species quite numerous in a wheat field belonging to Mr. T. R. Allen, of Allenton, where its larvæ were perhaps feeding on the Chinch Bugs, as they were found to do in North Illinois, by Dr. Shimer.

[Fig. 5.]



The Lacewing flies all bear a striking resemblance to one another, both in size, shape and color; and to convey a correct idea of their appearance, it is only necessary to repeat the annexed drawing (Fig 5.) from my First Report, where a sketch of their natural history will be found (pp. 57–8).† They almost all of them, in the fly state, have a characteristic and disagreeable odor, resembling nothing so much as human ordure.

According to Dr. Shimer, the Weeping Lacewing-fly was not quite as abundant as the Spotted Ladybird among the fodder-corn, but still there were so many of them, that he thought that "there was one or more of them for every stalk of that thickly sown corn." "Every stroke of the cutter," he adds, "would raise three or four dozen of them, presenting quite an interesting spectacle as they staggered along in their awkward, unsteady flight." And he not only actually observed the larvæ preying very voraciously on the Chinch Bugs in the field, but he reared great numbers of them to the mature Fly by feeding them upon Chinch Bugs. His account of the operations of the larva when in captivity is so interesting that I quote it in full:

I placed one of the larvæ in a vial, after having captured it in the field in the very act of devouring Chinch Bugs of all sizes, and subsequently introduced into the vial a number of Chinch Bugs. They had hardly reached the bottom before it seized one of the largest ones, pierced it with its long jaws, held it almost motionless for about a minute while it was sucking the juices from the body of its victim, and then threw down the lifeless shell. In this way, I saw it destroy in quick succession, about a dozen bugs. Towards the last, as its appetite was becoming satiated, it spent five or more minutes in sucking the juices from the body of one bug. After this bountiful repast, it remained motionless for an hour or more, as if asleep. Never for

*Proc. Ent. Soc. Phil., IV, pp. 208–12.

†In that account I stated as a fact which, so far as I was aware, had not been recorded by any previous writer, that the insect issues from the small cocoon in an active sub-imago state, from which, after a few hours, the winged fly emerges, leaving behind it a fine silvery-white transparent skin. I have since found that Dr. Shimer, in the scientific paper already referred to, had previously recorded the very same fact.

a single moment, during the feast, did it pause in the work. When not in possession of a bug, it was on the search for, or in the pursuit of others. It manifested much eagerness in the pursuit of its prey, yet not with a lion-like boldness; for on several occasions I observed a manifest timorousness, a halting in the attack, as if conscious of danger in its hunting expeditions, although here there was none. Sometimes, when two or more bugs were approaching rapidly, it would shrink back from the attack, and turning aside go in the pursuit of others. At length, awakening, it would renew the assault as before. On one occasion, when it was on the side of the vial, two inches up, with a large bug in its mouth, I jarred the vial, so that it fell to the bottom and rolled over and over across the bottom, but holding on to its prey, it regained its footing and mounted up to its former position. Occasionally the Chinch Bugs would hasten to escape when pursued, as if in some degree conscious of danger.

Fig. 6.

I

The Insidious Flower Bug, (*Anthocoris insidiosus*, Say), of which I represent herewith a highly magnified figure, (Fig. 6), may often be found in company with the Chinch Bug, under the husks of ears of corn. It is quite common in Missouri, where I have found it in several different galls, and especially in the Grape-vine Leaf-gall, where it was preying on the lice (*Phylloxera vitifoliæ*), which are the architects of the gall. It has often been mistaken for the Chinch Bug, and was upon one occasion sent to Dr. Fitch, by one of his correspondents, for that veritable Bug. Yet it undoubtedly preys upon the Chinch Bug, as well as upon a variety of other plant-feeding insects, and it therefore becomes very necessary that the farmer should learn to recognize it and distinguish it from the true culprit. It is very true that, practically, it will be found almost impossible to separate the sheep from the goats, and spare the lives of the former while condemning to destruction the unsavory little carcasses of the latter. Still, it will be some comfort to the grain-grower, when at some future day he may discover his small grain or his corn to be alive with Chinch Bugs, to perceive the bright orange-colored larvæ of the Insidious Flower-Bug dodging about among the blood-red or blood-brown larvæ of his bitter foes, and sucking out their life-blood with ravenous avidity; or to discover the little slow-going larvæ of the *Scymnus* group of Ladybirds, with such dense and evenly-shorn masses of short milk-white cottony threads growing out of their entire bodies that they look like little animated flakes of cotton wool, crawling about among the stinking crowd and making many a hearty meal off them, stink they never so badly; or, finally, to watch the lizard-like black and yellow larvæ of the Spotted Ladybird, and the Trim Ladybird, with their short, robust jaws, or the greenish-brown larvæ of the Lacewing-fly, with their long slender sickle-shaped jaws, running rapidly about among the hosts of their enemies, and smiting them hip and thigh without any more mercy than the Amale-

kites of old experienced at the hands of avenging Israel. He will then know that, even if he is himself powerless to make head against a host of minute foes, as numerous as the sand on the seashore, and as destructive and irresistible as the waves of the great ocean itself, Providence has provided a check upon the unlimited increase of his enemies; and that a Power which is above us all and provides for us all, and which alloweth not even a sparrow to fall to the ground unless by His especial permission, has said to every vegetable-feeding insect, through the mouths of the various Cannibal and Parasitic species which He has appointed to do His work: "Thus far shalt thou go, and no farther; and here shall thy proud hosts be stayed."

The common Quail of the Middle and Western States (*Ortyx Virginiana*) otherwise known as the Partridge in the Northern States has long since been known as a most efficient destroyer of Chinch Bugs, and the fact was some time ago published by myself in the *Prairie Farmer*, and by others in various Agricultural Journals and Reports. We also have the corroborative testimony of Dr. Shimer, who is a good ornithologist. In the winter time, when hard pushed for food, this bird must devour immense numbers of the little pests which winter in just such situations as are frequented by the Quail; and this bird should be protected from the gun of the sportsman in every State where the Chinch Bug is known to run riot.

AMOUNT OF DAMAGE DONE BY THE CHINCH BUG.

According to Dr. Shimer's estimate, which may be considered a reasonable one, in the year 1864 "three-fourths of the wheat and one-half of the corn crop were destroyed by the Chinch Bug throughout many extensive districts, comprising almost the entire Northwest." At the average annual rate of increase, according to the United States Census, in the State of Illinois, the wheat crop of 1864 ought to have been about thirty millions of bushels, and the corn-crop about one hundred and thirty-eight million bushels. Putting the cash value of wheat at $1.25 and that of corn at 50 cents, the cash value of the corn and wheat destroyed by this insignificant little bug, no bigger than a grain of rice, in one single State and in one single year, will therefore, according to the above figures, foot up to the astounding total of OVER SEVENTY-THREE MILLIONS OF DOLLARS! Put it as low as we choose, it is still a "big thing;" and it is unnecessary to argue a question any further, when facts and figures speak so plainly.

REMEDIES AGAINST THE CHINCH BUG.

It has long been noticed that the Chinch Bug commences its ravages in the spring from the edges of a piece of grain, or occasionally from one or more small patches, scattered at random in the more central portions of it, and usually drier than the rest of the field. From these particular parts it subsequently spreads by degrees over the whole field, multiplying as it goes and finally taking the entire crop unless checked up by seasonable rains. In newly-broken land,

where the fences are new and consequently no old stuff has had time to accumulate along them, the Chinch Bug is never heard of. These facts indicate that the mother insects must very generally pass the winter in the old dead stuff that usually gathers along fences. Hence, by way of precaution, it is advisable, whenever possible, to burn up such dead stuff in the winter or early in the spring, and particularly to rake together and burn up the old corn-stalks, instead of plowing them in, or allowing them, as is often done, to lie littering about on some piece of waste ground. It is true, agriculturally speaking, this is bad farming; but it is better to lose the manure contained in the corn-stalks than to have one's crop destroyed by insects. Whenever such small infected patches in a grain field are noticed early in the season, the rest of the field may often be saved by carting dry straw on to them and burning the straw on the spot, Chinch Bugs, green wheat and all; and this will be still easier to do when the bugs start along the edge of the field. If, as frequently happens, a piece of small grain is found about harvest-time to be so badly shrunken up by the bug as not to be worth cutting, the owner of it ought always to set fire to it and burn it up along with its ill-savored inhabitants. Thus, not only will the insect be prevented from migrating on to the adjacent corn-fields, but its future multiplication will be considerably checked.

A very simple, cheap and easy method of prevention was recommended in the *Prairie Farmer* of April 19th, 1862, by Mr. Wilson Phelps, of Crete, Illinois. It may very probably be effectual when the bugs are not too numerous, and certainly can do no harm:

With twelve bushels of spring wheat mix one bushel of winter rye, and sow in the usual manner. The rye not heading out, but spreading out close to the ground, the bugs will content themselves with eating it, until the wheat is too far advanced to be injured by them. There will, of course, be no danger of the winter rye mixing with the spring wheat.

When Chinch Bugs are likely to march, as they often do, after the fashion of Army-worms, from an infected to an uninfected field, Mr. H. J. Everest, of Stoughton, Dane county, Wisconsin, recommends the following plan, which is stated to have been tried by several persons and found to be perfectly effectual, and which is substantially the same as that referred to on page 23:

Take common fence-boards, six inches or less wide, and run them around the piece, set edgewise, and so that the bugs cannot get under them or between the joints, and then spread either pine or coal tar on the upper edge, and they will not cross it. The tar needs renewing till the edge gets saturated, so that it will keep wet and not dry in any more, and either kind of tar is effectual. Then dig holes close to the boards, about like a post-hole, once in four or five rods, and run a strip of tar from the top of the board to the bottom on the outside opposite the hole, and they will leave the board, and in trying to get around the tarred stripe will slide into the hole, where they will be obliged to remain till they can be buried at leisure, and new holes opened for more victims. It is seldom one has to fence more than

one side of a field, but wherever the fence is, it is a sure stop.—*Proc. New York Farmers' Club.*

Finally, when the Chinch Bugs are already in the field which it is proposed to rescue from their clutches, Mr. Michael Hopps, of Lyonsville, Cook county, Illinois, says that he saved a piece of wheat by sowing gas-lime broadcast over it, at the rate of six or seven bushels to the acre; and that the effect was that the bugs immediately left his field, and his crop was saved, while the wheat of his neighbors was nearly ruined by them. He further states that "a neighbor had a field of wheat adjoining his (Mr. Hopps's) cornfield, in which the bugs worked badly. Thinking that, as soon as the wheat was cut, they would emigrate to his corn, he dropped a handful of the gas-lime upon each hill of corn, in the same manner as plaster is often dropped upon corn in the East. The consequence was that the bugs did not attack the corn in the least."—(*Prairie Farmer.*)

But, if gas lime keeps off Chinch Bugs, which may or may not be the case, it appears that coal-tar most certainly will not do so, as the following experiment of Dr. Shimer's proves:

May 26th, 1864.—I saturated some saw-dust with coal-tar, and mixed some quick-lime among it, so that it might be in a good condition for handling, and sowed it thickly broadcast over a portion of my wheat field, where the bugs were very numerous.

May 27th–29th, 1864.—The bugs refuse to leave the part of the field where I sowed the tarred saw-dust, so there is but little hope of driving them from their once chosen grounds, by the seasonable application of strong-smelling drugs.

I have known farmers to follow the plan of going through a wheat field badly infested with Chinch Bugs, and with a sickle to cut, here and there, small patches of the wheat which they threw on the ground in the form of a loose irregular shock. The bugs would gather under these cut stalks in great numbers from the standing grain, and could then be destroyed either by crushing or by burning them with straw.

The above remedies are selected as the most likely to prove practically successful, from a mass floating round in the various Agricultural Journals, some of them utterly absurd and irrational, and others of very doubtful use. As to the ridiculous proposal put forth in the Waukegan (Ills.) *Gazette*, in 1865, with a great flourish of trumpets, by one D. H. Sherman of that town; namely, to destroy the Chinch Bugs in the egg state by pickling all the seed wheat; it is sufficient to observe that this insect *never* deposits its eggs upon the kernel of the ripe wheat. Consequently, to attempt to kill Chinch Bug eggs, by doctoring the seed wheat, would be pretty much like trying to kill the nits in a boy's head by applying a piece of sticking-plaster to his great toe. In the old *Practical Entomologist* (I, p. 48), I showed that there were no such eggs in the wheat kernels, which Mr. Sherman himself had sent me, and which he had supposed to be thus infested.

BOGUS CHINCH BUGS.

Few things are more astonishing than the acuteness of perception superinduced by being constantly conversant with some one particular subject. I have often been surprised at the readiness with which nurserymen will distinguish between different varieties of Apple, even in the dead of the year, when there are no leaves, and of course no fruit on their nursery trees. In the same way old practiced shepherds can recognize every individual sheep out of a large flock, though, to the eyes of a common observer, all the sheep look alike. Experienced grain-growers, again, can distinguish at a glance between twenty different varieties of wheat, which the best botanist in the country would fail to tell one from the other; and I have been informed that a miller of many years' standing, as soon as he has shouldered a sack of wheat, knows at once whether it is spring grain or fall grain; while ninety-nine entomologists out of every hundred would probably be unable, on the most careful inspection, to tell the difference between the two, and some might even mistake wheat for rye.

It is not surprising, therefore, that persons who have paid no particular attention to the study of insects, often confound together insects which, in the eyes of the professed entomologist, look as different from each other as a horse does from a cow or a hog. It would, indeed, be little short of miraculous if this were not so; for there are about thirty thousand distinct species of insects to be found within the limits of the United States, and of course in such a vast multiplicity, there must be many strong resemblances.

I will therefore conclude this article on the Chinch Bug, by briefly mentioning several true Bugs, belonging to the same Order of Half-winged Bugs (*Heteroptera*), as that pestilent little foe of the farmer, and which I know to be frequently mistaken for it. The reader will then, by comparing the different figures, see at once how widely they all differ, and by a very little practice, his eyes will become so well educated that he will soon, without any artificial assistance from glasses, be able to distinguish the creatures one from the other, as they crawl or fly about in the almost microscopic dimensions assigned to them by their Great Creator.

One reason, perhaps, why so many different bugs are popularly confounded with the Chinch Bug, is the similarity of their smell. Everybody is aware that Chinch Bugs possess the same peculiarly unsavory odor as the common Bed Bug; and hence when a person finds a small insect that has this obnoxious smell, he is very apt to jump to the conclusion that it must be a Chinch Bug. No mode of reasoning, however, can be more unsafe or unsound. There are hundreds of different species of Half-winged Bugs—the common brown Squash Bug (*Coreus tristis*) for example—that possess this peculiar smell; and what is stranger still, although this smell is more usually

met with among the plant-feeders, there are a few of the true Cannibals that possess it to perfection. Among these I may mention the Spined Soldier-bug (*Arma spinosa*, Dallas) whose portrait I here re-

[Fig. 7.]

a *b*

produce from my First Report (Fig. 7 *b*); for, as the bitterest enemy of the Colorado Potato Bug, and consequently one of our best friends, he cannot too often be presented, or become too well known. We can well afford to endure his unpleasant odor, when we duly reflect on his kind services. Just think of it, you bitter bug-haters—this little soldier has, beyond all doubt, saved thousands of dollars to the State of Missouri in the last few years, by heroically stabbing and slaying countless hosts of one of your worst enemies! That he should have the bed-buggy odor is not very surprising, since he appertains to a large and extensive group, (the *Scutellera* family) most of the other species belonging to which are plant-feeders. Indeed it is a very general rule, to which I know of but one exception* that the insect in the great *Reduvius* family among the Half-winged Bugs, every one of which is of carnivorous propensities, never have this peculiarly nauseous aroma; and that it is bestowed only upon certain plant-feeding bugs, to protect them no doubt from their insect foes, in the same manner as the skunk is protected from the eagle by his odoriferous tail. Yet while many of the plant-feeding Bugs do have this odor, a good many of them are entirely free from it, and some few of them really smell so agreeably that the fact has been thought worthy to be recorded by entomological writers. Even that detestable pest, already referred to, the common Squash Bug, sometimes emits a pleasant aroma, altogether different from that which it normally gives out; for I have kept this winter, in a separate box, one which emits a most pungent but agreeable smell, very much resembling that of a very ripe, rich pear. But perhaps the most suggestive fact of all is that, notwithstanding the close alliance between the two Orders of Half-winged and Whole-winged Bugs, there is not a single known species of the latter that has ever been known to exhale the bedbuggy effluvium, which is met with in so many species belonging to the former.

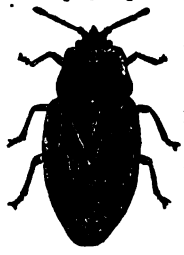
THE INSIDIOUS FLOWER-BUG.—First among the insects frequently mistaken for the Chinch Bug, may be mentioned the Insidious Flower-bug (*Anthocoris insidious*, Say) already referred to under the head of "Cannibal Foes of the Chinch Bug." This little Flower-bug has been usually referred by entomologists to the same extensive group (*Lygæus* family) as the true Chinch Bug, though more recent authors have placed it in a distinct group on account of its short three-jointed beak.

THE ASH-GRAY LEAF-BUG.—Second among the Bogus Chinch Bugs may be mentioned the Ash-gray Leaf-bug (*Piesma cinerea*, Say) a

* A shiny black species of *Nabis* (*Nabis marginatus*, Uhler, MS) smells as much like a Bed Bug as the most peaceable Plant-feeder.

small greenish-gray bug of which I present herewith a highly magnified figure (Fig. 8), its true size being about the same as that of the Chinch Bug for which it has been mistaken, though it lacks altogether the conspicuous black and white markings which characterize that little grain pest, and really resembles it in nothing but the unpleasant odor which it emits. In the summer of 1868, Col. F. Hecker, of St. Clair county, Illinois (See *Am. Entomologist*, I, p. 19), found an insect, which he mistook for the Chinch Bug, destroying the blossom buds of his grape-vines. Now as the Ash-gray Leaf-bug is known to work in this way on the Grape-vine, and as I found it abundant in Col. Foster's vineyard, on the Iron Mountain Railroad in this State, it was doubtless this species which injured Col. Hecker's vines; for the true Chinch Bug has never hitherto been observed to attack woody plants like the Grape-vine, but confines itself exclusively to herbaceous plants, such as wheat, oats, Indian corn, etc. The Ash-gray Leaf-bug belongs to an entirely different group from the Chinch Bug (*Tingis* family) all the species of which have a short 3-jointed beak, which however differs from that of the 3-jointed beak of the Flower-bugs (*Anthocoris*) by being encased in a groove when not in use. They mostly live on green leaves in all their three stages, after the fashion of plant lice. Like the Chinch Bug, the Ash-gray Leaf-bug hybernates in the perfect state, and may be found in the winter in considerable numbers under the loose bark of standing trees and especially under that of the Shag-bark Hickory.

[Fig. 8.]



With the exception of the Ash-gray Leaf-bug, there is no North American species belonging to the genus, that is known to attack fruit trees or fruit-bearing bushes or vines; though there are several that infest forest trees—each species generally confining itself to a particular genus of trees. But in Europe there is a species, the Pear-tree Leaf-bug (*Tingis pyri*) which is so injurious to the Pear, that the French gardeners have given it the name of "the Tiger." It is to be hoped that it may never, like another European pest of pear-growers, the Pear-tree Flea-louse (*Psylla pyri*)—which has already been introduced into the New England States, and will perhaps make its way out West—traverse the Atlantic ocean and take out its naturalization papers in this country.

THE FLEA-LIKE NEGRO-BUG.—Third among the bogus Chinch Bugs may be mentioned the Flea-like Negro-bug (*Corimelæna pulicaria*, Germar), of which I here present a magnified outline (Fig. 9). Its color is black with a white stripe each side. This insect resembles the Chinch Bug in having an ordinary 4-jointed beak, but differs from it in belonging to a very distinct and well marked group (*Scutellera* family), which is characterized by the enormous size of the "scutel" or shield.

[Fig. 9.]

In the most numerously represented division of this family the scutel forms a large triangle, extending along the back about half-way to the tip of the abdomen, as may be seen in the figure of the Spined Soldier-bug (Fig. 7), referred to on a previous page. But in another division of this family which does not contain nearly so many species, the scutel, instead of being angular, is rounded at top and covers more or less the entire upper surface of the abdomen. It is to this last division that the Flea-like Negro-bug belongs, and the dirty yellow or white stripes at its sides are really nothing but the thickened anterior edge of the front wings, all the remaining part of the front wings, as well as the entire hind wings, being, in repose, completely hidden under this enormously extended shield. In the Bordered Soldier-bug, as the reader will perceive from the annexed drawing (Fig. 10), which I reproduce from my First Report, the scutel is indeed rounded, and also extends a considerable distance over the abdomen; but as it otherwise agrees with the other Soldier-bugs in the rest of its organization, it is classified with them. and not with our Negro-bug.

[Fig. 10.]

The Flea-like Negro-bug has been known to injure various plants for two or three years back. I found it exceedingly abundant last summer in all parts of the State which I visited. It has a great passion for the fruit of the Raspberry, and is sometimes so plentiful as to render the berries perfectly unsaleable by the bed-bug aroma which it communicates to them, as well as by sucking out their juices. Wherever it occurs, the nauseous flavor which it imparts to every berry which it touches, will soon make its presence manifest. though the little scamp may elude ocular detection. It is really too bad that such a little black varmint should so mar the exceeding pleasure which a lover of this delicious fruit always experiences when in the midst of a raspberry plantation in the fruit season. It is also quite injurious to the Strawberry, puncturing the stem with its little beak, and thus causing either blossom or fruit to wilt; and the following extract, taken from a communication to the *Western Rural* by Mr. B. Pullen, of Centralia, Ills., undoubtedly refers to the same Bug, and would indicate that it made its first appearance in that neighborhood last summer:

"A new insect, to us here, has appeared on our strawberries for the first time the past season, damaging the crop very much. It resembles somewhat the Chinch Bug, so destructive to our wheat and corn, and, judging from the peculiar odor they emit on being mashed, should think them very nearly related. Some claim that they are of a different species altogether. Whether this be so or not those interested in the cultivation of the strawberry are anxiously looking forward to another season to see if they are to continue their depredations."

It likewise attacks the Strawberry in Canada, as an account of its attacking that plant, is given by my friend, C. J. S. Bethune, in the

Canada Farmer for August 1st, 1867; and it was under this very same serious charge that it was apprehended and brought up for trial at the last May meeting of the Alton (Ills.) Horticultural Society. It also attacks both Cherry and Quince, occurring on these trees in very large numbers, and puncturing the blossoms and leaves, but especially the fruit stems, which in consequence shrivel and die. It is also quite injurious to garden flowers and especially to the Coreopsis, and abounds on certain weeds, among which may be mentioned the Red-root or New Jersey Tea-plant (*Ceanothus Americanus*), and Neckweed or Purslane-speedwell (*Veronica peregrina*). In the month of June under these two last named plants, they may be found in countless numbers of all sizes and ages, from the small light brown wingless, newly hatched individuals, to the full fledged jet black ones. In fact they breed on these weeds, and there is no more effectual method of checking their increase and thus preventing their injuries to our cultivated fruits, than by sprinkling these weeds, and the ground underneath them, with a good strong solution of Cresylic soap. I should advise the propagation of a small patch of either one of these weeds near a strawberry patch, as a decoy for the Bugs, which may thus be, to some extent, enticed away from the strawberry plants, and killed more readily.

There are two other species of Negro-bug which are common in this State, though they never swarm in such injurious profusion as does the Flea-like Negro-bug. The first of these (*Corimelæna lateralis*, Fabr.) is absolutely undistinguishable from it however, except in being fully one-half longer and wider. The shape, sculpturing and coloring are exactly the same, even down to the lateral white stripe; so that, but for the fact of no intermediate grades in size occurring, the two would be certainly considered as mere varieties of one and the same species. The other Negro-bug (*Cor. unicolor*, Beauv.) is fully twice as long and wide as our insect; but though resembling it closely in every other respect, yet differs very notably in lacking the white anterior edging to the front wings. It might indeed be said, that the biggest Negro dresses entirely in black, while the two other smaller sized darkies relieve the sombre monotony of their sable suits, by wearing a conspicuously white shirt-collar.

To these three bogus Chinch Bugs, might be added one or two other species of small stinking Bugs which have been, by some persons, mistaken for the true Chinch Bug. But enough has been already said to show, that insects which in reality are shaped and fashioned as differently as are cows and deer, are yet often confounded together in the popular eye, principally, no doubt, because they have the same peculiar bed-bug aroma. Should the ignorance of the popular judgment in confounding these tiny creatures which seem to the Entomologist so very, very different from each other, therefore, be despised and ridiculed? Far be it from me to display such intolerant stupidity! As well might the nurseryman ridicule the grain-grower,

because the grain-grower cannot distinguish a Baldwin Seedling from a High top apple; or the grain-grower the nurseryman because the nurseryman cannot tell Mediterranean from Tea wheat, or Club from Fife. I do, however, entertain an abiding hope that by the present very general and praiseworthy movement towards the popularization of Natural History, and by the dissemination of Entomological Reports, a better knowledge of this practically important subject will soon exist in the community. Our farmers will then, not so often wage a war of extermination against their best friends, the cannibal and parasitic insects, while they overlook and neglect the very plant-feeders which are doing all the damage, and upon which the others are feeding in the very manner in which a Wise Providence has appointed them to adopt.

RECAPITULATION.

The following important points in the history of the Chinch Bug, may be considered as firmly established:

1st. Chinch Bugs hybernate in the perfect or winged state in any old dry rubbish, under dead leaves, in old straw, in corn-shucks and corn-stalks, among weeds in fence-corners, etc., etc. Therefore all such substances should be burned up, as far as possible, in the spring.

2nd. The earlier small grain can be sowed in the spring, the more likely it is to escape the Chinch Bug; for it will then get ripe before the spring brood of bugs has had time to become fully developed at the expense of the grain.

3d. The harder the ground is where the grain is sowed, the less chance there is for the Chinch Bug to penetrate to the roots of the grain and lay its eggs thereon. Hence the importance of fall-ploughing and using the roller upon land that is loose and friable. And hence, if old corn-ground is sufficiently clean, it is a good plan to harrow in a crop of small grain upon it without ploughing it at all. Moreover this rolling plan should always be adopted, as the best wheat-growers both in this country and in Europe attest that the heavier the ground for wheat is rolled, the better will be the crop.

4th. A single heavy rain immediately checks up the propagation of the Chinch Bugs. Continued heavy rains diminish their numbers most materially. A long-continued wet season, such as that of 1865, almost sweeps the whole brood of them from off the face of the earth; but from the rapid rate at which they multiply there will always be enough left for seed for another year. It may be laid down, not only as a general, but universal rule, that this insect is never ruinously destructive, except in those sections of country where there is continued hot dry weather; and that if, in two adjoining districts, there has been a dry summer in one and much wet weather during the summer season in the other, however plentiful and destructive the bug may be in the first district, it will scarcely be heard of in the second. Certainly this state of facts is not exactly that from which any reasonable man would infer, that the paucity of Chinch Bugs in a wet

season is caused by an Epidemic Disease taking them off. We might as well maintain that, although there was no Epidemic Disease among the children of Israel that had just crossed the Red Sea, or among the Egyptians that staid at home, it was simply and solely an Epidemic Disease that slew the pursuing hosts of the Egyptians and covered the bottom of the Red Sea with their carcasses.

THE ARMY-WORM—*Leucania unipuncta*, Haw.

[Lepidoptera Noctuidæ.]

Among those insects which attract especial attention, either from the peculiarity of their habits, or the vast amount of damage which they inflict, the notorious Army-worm holds a conspicuous place. The mode in which these worms travel in vast armies when in search of food, the great value of the cereals and the grasses to which they for the most part confine their ravages, their sudden appearance in such incomputable numbers, and their equally sudden disappearance, all tend to arouse the curiosity and interest of even the most indifferent observer.

Before giving a history of this insect, it will be necessary to state that there are four distinct caterpillars, producing four perfectly distinct moths, which have been designated as Army-worms in various parts of the United States.

First—The Tent-caterpillar of the Forest (*Clisiocampa sylvatica*, Harr.) has been erroneously known by the name of "Army-worm" in the northwest corner of the State of New York. A back view of this caterpillar is given in the accompanying sketch (Fig. 11)

[Fig. 11.]

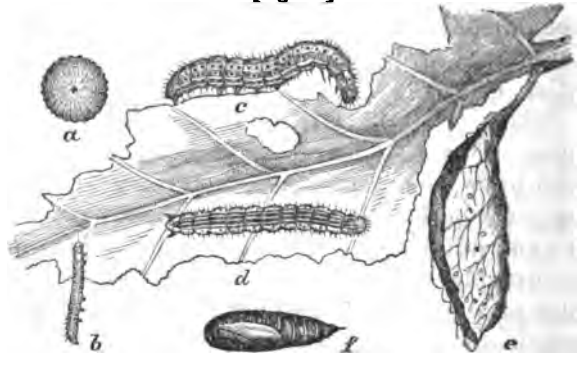
by which it will at once be recognized by the reader. For a number of days, last June, this worm might have been seen marching "single file" up the railroad track on Pilot Knob, in the scorching rays of the noonday sun; and it is often found crawling along roads in very considerable numbers. Yet it cannot with propriety be called an Army-worm, and our Eastern friends had best drop the title and avoid confusion in the future.

Second—The Cotton-worm (*Anomis xylina*, Say), is very generally known by the name of "the Cotton Army-worm," in the South. The term as applied to this species is not altogether inappropriate, as the worm frequently appears in immense armies, and when moved by necessity will travel over the ground in "solid phalanx;" and so long as the word "Cotton" is attached—its ravages being strictly confined to this plant—there is no danger of its being confounded with the true Army-worm. The term has furthermore received the sanction of custom in the Southern States, and of Mr. Glover in his Department Reports.

As various attempts have been made, with more or less success, to grow the cotton plant in the southern parts of this State, a description of this insect will not be inappropriate, the more. especially, since it will teach the reader the difference between it and the true Army-worm.

The Cotton-worm was first scientifically described by Mr. Thomas Say, in the year 1827. According to Dr. D. L. Phares, of Woodville, Miss., it destroyed at a low estimate, 200 tons of cotton in the Bahamas as long ago as 1788; while in Georgia it completely destroyed the crop in 1793. According to Dr. Capers* its injuries were noticed in 1800, and it likewise proved very destructive in 1804, 1825 and 1826. Since the last date, as we may learn from old volumes of the *American Farmer*, of Baltimore, Md., and from the Patent Office Reports, it has done more or less damage to the crop almost annually, in some part or other of the cotton-growing district. As with the real grass-feeding Army-worm of the Middle States, it swarms in particular years to such an extent as to utterly ruin the crop, while in other years it is scarcely noticed. This fact has led many to infer that there is a stated periodicity in its returns in such immense numbers; but the natural history of the worm confutes such an idea, while the records give no foundation for the inference. The sudden increase or decrease of this, as of other species of noxious insects, depends on climatic, as well as on other equally potent influences.

[Fig. 12.]



The egg, (Fig. 12, *a*), according to Dr. Phares is shaped "precisely like a scull-cap, with rows of pinheads from base to apex as thickly set as possible," appearing as if moulded in a very deep saucer. These eggs are of a translucent green color, and are deposited upon the under side of the leaves, and from their small size, are naturally difficult of detection. Each female moth deposits from 400 to 600, and according to the late Thomas Affleck, of Brenham, Texas, they hatch two days after being deposited, if the weather be moist and warm. The worms (Fig. 12 *b*, ½ grown) at first feed upon the parenchyma or soft fleshy parts of the leaves, but afterwards devour in-

*Patent Office Rep., 1855, p. 74.

differently, not only any portion of the leaves, but also the blossom-bud and blossom, together with the calyx leaves at the base of the boll, thus causing the lobes which hold the cotton, to fall entirely back and allow the cotton to drop at the slightest touch. While young these worms readily let themselves down by a web when disturbed, but when older they make less use of this web, and jerk themselves away to a considerable distance when suddenly touched. They cast their skins at five successive periods, and come to their growth in the incredibly short space of fifteen or twenty days. Mr. Affleck even states that they usually enter the chrysalis state on the eleventh day after hatching; but I incline to believe that such a brief larval existence is extremely exceptional, and the length of time required for them to mature will not only differ in different individuals of the same brood, but will vary with the state of the atmosphere. At Figure 12 *c* is given a side view, and at *d* a back view of a full-grown worm. It has the normal complement of legs—namely 16—but the two foremost pair of false legs, or those under segments 6 and 7, are so reduced in size that they are scarcely used in motion, and it consequently loops when walking.

I have upon two occasions received full-grown specimens of this worm, and they differ materially, both in depth of shade, coloration and markings, as indeed do almost all the larvæ of moths belonging to the same (*Noctua*) family. The most common color is light green, though they are frequently quite dark with a purplish hue at the sides, and with black backs. Whether light or dark colored, however, they are more or less distinctly marked with pale longitudinal lines and black spots, as in the above figures.

Mr. Lyman, in his "Cotton Culture," says of this insect: "The first moths that visit a crop deposit their eggs and die. These eggs in ten days become little worms, which fall to eating the leaf on which they were hatched, and as they grow, consume the plant and pass to another. But age comes on apace with these ephemeral creatures; the worm presently grows weary of devouring, selects a leaf, rolls himself in a little cocoon and *dies*." Of course this is a serious mistake to think that the worm dies, else how could it produce the moth which, as Mr. Lyman himself shows, afterwards issues from the cocoon. It is astonishing to find such gross errors creeping into our popular works, but then, the study of these contemptible little Bugs, even if they do sometimes totally destroy the crop, is of course beneath the dignity of the man who can write a work on cotton culture!! The truth of the matter is that, when they have completed their growth, the worms fold over the edge of a leaf (Fig. 12 *e*), and, after lining the inside with silk, change to chrysalids (Fig. 12 *f*), which are at first green, but soon acquire a chestnut-brown color; after remaining in this last state (in which, though the insect is inactive, it is yet full of life, and undergoing wonderful development) from seven to fourteen days, or even longer, the moth escapes, the chrysalis being held fast

within the cocoon by means of several very minute hooks with which the tail is furnished.

[Fig. 13.]

a *b*

At Figure 13 *a*, this moth is represented with the wings expanded, and at *b*, with the wings closed. The general color of the upper surface is a golden-yellow inclining to buff, with a faint olive tint near the outer or posterior margin. The fore wings are crossed, as in the above figures, by more or less distinct, irregular lilac-colored lines. But the chief characteristic is a dark slate-colored, or black spot on the front wings, in which spot there are paler scales forming almost a double pupil as represented in the figures, while between this spot and the base of the wings there is a much smaller pure white dot. In general color and in the position of the larger spot, this moth bears a remarkable resemblance to that of the true Army-worm of the Northern and Middle States.

Mr. Affleck, who certainly had abundant opportunities for observing the fact, assured me that this moth rests in the position shown in Figure 13, *b*, namely, with the head downwards. He wrote on August 22d, 1868: "The Cotton moth (*Ophinsa xylina* of Harris in his correspondence with myself) never alights in any other position, or if by accident it first assumes another position, it instantly wheels around *head down*."

According to the best authority, there are three different broods of worms during the year, the first appearing in June or July, and the last, which does the most damage, appearing in August or September, or even later. Mr. Lyman, in the little work already referred to, says: "That nature has made no provision by which either the fly, the worm, the chrysalis or the eggs, can survive the winter or exist for any length of time where the cotton plant is not a perennial." But this is surely an error, which Mr. Lyman would never have made, had he possessed a better knowledge of insect-life; and as Mr. Glover found that the chrysalis was killed by the slightest frost, the insect evidently winters over in the moth state, as do many others belonging to the same tribe. Mr. W. B. Seabrook gives strong evidence that this is the case, in a "Memoir on the Cotton Plant," read in 1843, before the State Agricultural Society of South Carolina, wherein he says: "That the Cotton Moth survives the winter is nearly certain. An examination of the neighboring woods, especially after a mild winter, has often been successfully made for that purpose." And Dr. Phares states positively that the moth hybernates in piles of cotton seed under shelter, under bark and in crevices of trees in dense forests and other secluded places, and that it may often be seen on pleasant days in winter.

The two principal remedies which have hitherto been relied upon are, 1st, hand-picking; 2d, destroying the moths by fires, to which they are naturally attracted. The first method is sure, but tedious and somewhat impracticable on a very large scale. The second is most effectual if carried out when the first moths appear, in May and June. If these two methods were persistently carried out in the early part of the season throughout any given cotton-growing county, they would of themselves be sufficient to save the crop; but the efforts of individuals are of no avail, where there are slovenly neighbors who neglect to perform these labors. It would therefore be of incalculable advantage, if something could be applied to the plants which would prevent the moths from depositing their eggs upon them, as the industrious planter could then set at defiance his more slovenly neighbor. Mr. Affleck was enthusiastic in his praise of cresylic soap as such a plant-protector, and I received a long letter, written a few weeks previous to his death, and showing how he had found that no cotton moth had ever deposited an egg on any plant that had been sprinkled with a solution of this soap. But Dr. Phares states that it was pretty thoroughly tried last year, and proved a failure, though he does not give the reason why.

It is some little consolation to know that the character of the season determines their numbers, and that if none make their appearance in any stage by the first of July, there is little to be feared from them the rest of that year.

Third—There is in the South another insect (*Laphrygma frugiperda*, Sm. & Abb.?) which is frequently known by the ominous name of "Army worm;" an insect which also will attack cotton, though it prefers grasses and weeds. This species in its habits resembles the true Army-worm of the Middle States, more closely perhaps than does the Cotton Army-worm, and Mr. Joseph B. Lyman, in his recent work on "Cotton culture"* (p. 92), calls it *the* "Army-worm;" yet to prevent confusion, the cognomen should be discontinued, and the term "Southern Grass-worm" (by which it is already very generally known) should be strictly applied to this third bogus Army-worm. We now come to the veritable Army-worm of the Northern and Middle States—the insect which is the subject of this article, and we will dwell for a few moments on the

PAST HISTORY OF THE TRUE ARMY-WORM.

If we trace back the history of the Army-worm in this country, we find that inaccuracy and confusion characterize most of the records concerning it previous to the year 1861. In that year, however, by the contemporaneous observations and experiments of several entomologists, in different sections of the United States, its natural history was first made known to the world, and the parent moth identified.

* Cotton Culture, by J. B. Lyman, late of Louisiana. Orange Judd & Co., New York.

The very earliest record which we find of its appearance in this country is in Flint's 2nd Report on the Agriculture of Massachusetts, where it is stated that in 1743 "there were millions of devouring worms in armies, threatening to cut off every green thing."

In 1770 it spread over New England in alarming numbers. Dr. Fitch in his 6th Report quotes the following full and interesting account from the Rev. Grant Powers's Historical Sketches of the Coös Country in the Northern part of New Hampshire. "In the summer of 1770 an army of worms extended from Lancaster, the shire town of Coös County, N. H., to Northfield, Mass., almost the whole length of the Granite State. They began to appear the latter part of July, and continued their ravages until September. They were then called the 'Northern Army,' as they seemed to advance from the north or northwest to the south. It was not known that they passed the highlands between the rivers Connecticut and Merrimack. Dr. Burton, of Thetford, Vermont, informed the author that he had seen the pastures so covered with them, that he could not put down his finger without touching a worm, remarking that 'he had seen more than ten bushels in a heap.' They were unlike anything that generation had ever seen. There was a stripe upon the back like black velvet, and on each side a stripe of yellow from end to end, and the rest of the body was brown. They were seen not larger than a pin, but in maturity were as long as a man's finger and of proportionate thickness. They appeared to be in great haste, except when they halted to feed. They entered the houses of the people and came up into the kneading troughs as did the frogs in Egypt. They went up the sides of the houses and over them in such compact columns that nothing of the boards or shingles could be seen. Pumpkin-vines, peas, potatoes and flax escaped their ravages. But wheat and corn disappeared before them as by magic. Fields of corn in the Haverhill and Newbury meadows, so thick that a man could hardly be seen a rod distant, were in ten days entirely defoliated by the 'Northern Army.' Trenches were dug around fields a foot deep, as a defence, but they were soon filled and the millions in the rear passed on and took possession of the interdicted feed. Another expedient was resorted to: Trenches were cut, and thin sticks, six inches in diameter, were sharpened and used to make holes in the bottom of the trenches within two or three feet of one another, to the depth of two or three feet in the bottom lands, and when these holes were filled with worms, the stick was plunged into the holes, thus destroying the vermin. In this way some corn was saved. About the first of September the worms suddenly disappeared. Where or how they terminated their career is unknown, for not the carcass of a worm was seen. Had it not been for pumpkins, which were exceedingly abundant, and potatoes, the people would have greatly suffered for food. As it was, great privation was felt on account of the loss of grass and grain."

The same writer adds that "in 1781, eleven years after, the same kind of worm appeared again, and the fears of the people were greatly excited, but this time they were few in number."

In 1790 their ravages are again recorded in Connecticut, where they were very destructive to the grass and corn, but their existence was short, all dying in a few weeks (Webster on Pestilence, I, 272.)

Their next appearance in the Eastern States was in 1817, after an interval of twenty-seven years, according to Fitch, who quotes the following paragraph from the Albany (N. Y.) *Argus:*

Worcester, Mass., May 22nd, 1817.—"We learn that the black worm is making great ravages on some farms in this town, and in many other places in this part of the country. Their march is a 'displayed column,' and their progress is as distinctly marked as the course of a fire which has overrun the herbage in a dry pasture. Not a blade of grass is left standing in their rear. From the appearance of the worm it is supposed to be the same which usually infests gardens, and is commonly called the *cut worm.* * * * This same worm is also destroying the vegetation in the northern towns of Rensselaer and eastern section of Saratoga, New York. Many meadows and pastures have been rendered by their depredations as barren as a heath. It appears to be the same species of worm that has created so much alarm in Worcester county, but we suspect it is different from the cut worm, whose ravages appear to be confined to corn."

It was not until after a lapse of forty-four years from the last mentioned date, namely, in the summer of 1861, that this worm again spread over the meadows and grain fields of the Eastern States. During the interval, however, it had from time to time attracted attention in the Western States, where it often proved quite destructive. Thus, in Illinois, it is recorded as having appeared in 1818, 1820, 1825, 1826, 1834, 1841, 1842, 1845 and 1856, and according to Mr. B. F. Wiley, of Makanda, Ill., it was quite numerous and destructive in the southern part of the State in 1849, and appeared there also in 1857, though it was confined that year to limited localities.* Mr. J. Kirkpatrick, of Ohio, mentions its appearance in the northern part of that State in 1855. He says: "Last season (1855), in consequence of the heavy rains in the early part of June, the flats of the Cuyahoga, near Cleveland, were flooded. After the subsidence of the water, and while the grass was yet coated with the muddy deposit, myriads of small blackish caterpillars appeared; almost every blade had its inhabitant; no animal could feed upon it without, at every bite, swallowing several; if a new blade sprung up, it was immediately devoured, but what was most remarkable, the insects did not attempt to remove to land a foot or two higher but that had not been covered by the water."†

*Prairie Farmer, July 18th, 1861.

†Ohio Agricultural Report, 1855, p. 350.

The year 1861 will long be remembered as a remarkable Army-worm year, for this insect was observed in particular localities throughout the whole northern and middle portion of the United States from New England to Kansas. It was first noticed in numbers sufficient to cause alarm, in Tennessee and Kentucky during the month of April; and toward the close of the same month it appeared in the southern counties of Illinois. By the end of June it had visited nearly all portions of the latter State, proving more or less destructive to grass, wheat, oats, rye, sorghum and corn.

Its advent in Missouri was simultaneous with that in Illinois, and judging from what facts I have accumulated, it occurred very generally over this State, though recorded only in St. Louis, Jefferson, Warren, Boone, Howard and Pike counties. No mention is made of its occurrence, at this time, in any of the States or Territories west of Missouri, but to the East, scarcely a single State escaped its ravages. In many portions of Ohio it entirely destroyed the hay and grain crops, and in the eastern part of Massachusetts the damage done was reported to exceed a half million of dollars.

Singularly enough, I can find no trace of the occurrence of this insect in Missouri prior to the year 1861, and the first intelligible account of it from the pen of a Missourian, is that by Dr. Wislizenus of St. Louis, published in the Transactions of the St. Louis Academy of Science (Vol. II, No. 1, pp. 159–60). My good friend Wislizenus then erroneously supposed it to be identical with the *Bombyx graminis* of Northern Europe—an insect which commits similar devastations on the grasses and cereals in that country. But I believe he is now well aware that it is an entirely distinct species.

Since 1861 the Army-worm has never spread so generally over such a vast extent of country, though in 1865 it appeared in considerable numbers around St. Joseph in this State, and in 1866 did some damage near Quincy, Ills., as we learn from the Quincy *Whig*.

Last year it made its appearance again in vast numbers in many portions of this State, especially in St. Louis, Jefferson, Cooper, Callaway, Henry, St. Clair, Marion, Ralls, and Lafayette counties, and in some counties in Illinois and Indiana. The first intimation I received of its appearance in Missouri was the following letter sent to me by Mr. A. E. Trabue of Hannibal, under date of June 8th:

I inclose a match-box with grass and two worms, which we think are Army-worms. They are here in myriads destroying the grass. Destroyed a hundred acres of blue grass meadow in five days, and are now advancing on me. What are they and their habits?

Carbolic acid (one part acid, 20 parts water) kills them if they get a good drench with it, but is too expensive at that rate. They will cross a trail of it without injury, though they evidently dislike the smell. Have sent to town for coal tar to see if they will cross it when the ground is soaked with it. The advancing column is a half mile wide.

The hogs are very fond of them; will not notice corn when they

can get Army-worms, but we have more of the latter than they can dispose of.

A. E. TRABUE.

Upon receipt of this letter, I visited Hannibal and ascertained that the worm was even more numerous around New London, and especially on the farm of Mr. A. McPike.

ITS SUDDEN APPEARANCE AND DISAPPEARANCE.

The popular idea about the sudden appearance of an insect has always been an erroneous one. The 'blows" or "gentiles" in meat, "skippers" and mites in cheese, plant-lice on plants, etc., etc., are very generally supposed to have a spontaneous origin, and our sudden Army-worm invasions have very generally been accounted for in the same way, by those who know nothing of Nature's workings. Yes, and so-called *savans*—will it be credited!—have been anxious to so far tickle the popular fancy as to conceive and give birth to theories (such as that of larval reproduction) which were not one whit more sensible or tenable.

It is well known to entomologists, and the reader, by perusing the article on "Cut-worms" in my First Report, will soon become aware of the fact, that most of the larvæ of our Owlet Moths (family *Noctuidæ*) rest hidden during the day and feed in the morning and evening, or at night. They are all smooth, tender-skinned worms, and cannot endure the scorching rays of the sun. Consequently many of them live almost habitually, just under the surface of the soil, while others shelter themselves under vegetable substances during the day. Our Army-worm forms no exception to the rule, for upon closely watching the habits of the hosts I witnessed last summer in the field, and of hundreds which I had confined in breeding cages, I ascertained that they frequently hide themselves Cut-worm fashion, just under the surface of the ground, or under the plants upon which they feed. The Army-worm delights, in fact, in cool, moist and shady situations, and from the passage already quoted, from Mr. Kirkpatrick, where it is shown that the worms which swarmed on the Cuyahogo flats, did not attempt to remove to land a foot or so higher: and from further facts recorded by Dr. Fitch, it becomes evident that its natural abode is in the wild grass of our swamps, or on low lands. During an excessive dry summer these swampy places dry out, and the insect, having a wider range where the conditions for its successful development are favorable, becomes greatly multiplied. The eggs are consequently deposited over a greater area of territory, and if the succeeding year prove wet and favorable to the growth of the worms we shall have the abnormal condition of their appearing on our higher and drier lands, and of their marching from one field to another. For just so soon as the green grass is devoured, in any particular field in which they may have hatched, these worms are forced, both from hunger and from their sensibility to the sun's rays, to leave the denuded field.

Thus the fact becomes at once significant and explicable, that almost all great Army-worm years have been unusually wet, with the preceding year unusually dry, as Dr. Fitch has proved by record. The appearance of this insect last summer in the West forms no exception, for the summer of 1868 was unusually dry and hot, while that of 1869 was decidedly wet. I may remark here, in further corroboration of these views, that, as might have been expected, no Army-worms were noticed last year in the Eastern States; for though in the summer of 1868 we of the West suffered so severely from drouth, yet in the East they were blessed with the usual amount of rain fall, and in some sections had even more than the average amount.

There is in reality nothing in the least mysterious in the sudden appearance and disappearance of the Army-worm, for the truth of the matter is, that there are a few of these insects in some part or other of the country every year, and I have for the past four or five years captured one or more specimens of the moth every fall. The eggs hatch during the early part of May, in the latitude of South Illinois and South Missouri, and the young worms may feed by millions in a meadow without attracting attention; but when they have become nearly full grown and have stripped bare the fields in which they were born, and commence to march as described above, they necessarily attract attention, for they are then exceedingly voracious, devouring more during the last three or four days of their worm-life, than they had done during the whole of their previous existence. As soon as they are full grown they burrow into the earth, and, of course, are never seen again as worms.

Their increase and decrease is dependent on even more potent influences than those of a climatic nature. The worms are attacked by at least eight different parasites, and when we understand how persistent these last are, and how thoroughly they accomplish their murderous work, we cease to wonder at the almost total annihilation of the Army-worm the year following its appearance in such hosts. In the words of the late J. Kirkpatrick "their undue increase but combines the assaults of their enemies and thus brings them within bounds again."

We must also bear in mind, that besides these parasitic insects, there are some cannibal insects, such as the Fiery Ground-beetle (*Calosoma calidum*, Fabr.) and its larva,* which prey unmercifully upon the worms, while the "Mosquito Hawks" (*Libellulæ*) and bats doubtless destroy many of the moths. Hogs, chickens and turkeys revel in the juicy carcasses of the worms, and sometimes to such an extent that, as I am informed by Mr. T. R. Allen, of Allenton, the former occasionally die in consequence, and the latter have been known to lay eggs in which the parts naturally white, would be green when cooked. Small birds, of various kinds, and toads and frogs also,

*First Report, Fig. 34.

come in for their share of this dainty food; while the worms, when hard pushed, will even devour each other.

NATURAL HISTORY OF THE ARMY-WORM.

Previous to the year 1861, but very little accurate knowledge had been acquired respecting the habits of the Army-worm, and nothing whatever of a scientific nature had been published.

A few very observing farmers ventured to predict its appearance during very wet summers succeeding very dry ones. They did not know why this was the case, but it was a fact that they had learned from experience. It was also known that the worm attacked only the grasses and cereals, that it was gregarious in its habits, and that it disappeared suddenly, in a manner as seemingly mysterious as that in which its advent was supposed to have been made.

These few facts were about the only ones of real value, respecting the habits of this insect, that could be gleaned from the statements of those who had suffered most from its ravages; while the subject seems to have been, up to that time, entirely ignored by entomological writers.

In 1861, however, its very general appearance, and the vast amount of damage it did, attracted the attention, not only of farmers, but of several well-known entomologists, among whom may be mentioned our late friends, Walsh, of Illinois, and Kirkpatrick, of Ohio; and Cyrus Thomas, of Illinois, Dr. Fitch, of New York, and J. H. Klippart, of Ohio.

As might have been expected, diverse conclusions were arrived at, and various theories entertained by these writers, and some very spirited correspondence between Messrs. Walsh and Thomas and Walsh and Klippart may be found in old files of both the *Ohio Farmer* and the *Prairie Farmer*.

The principal point of dispute was, whether the Army-worm wintered in the egg or chrysalis state, and, as a consequence, whether it was single or double-brooded.

It is needless to follow these gentlemen in their discussions, which were frequently caustic and pungent; but sometimes partook more of the character of personal wrangling than of a calm and conscientious search after truth. Two of the five parties mentioned above, are now in their graves, and while one of those yet living—Mr. Cyrus Thomas—believed in the two-brooded character of the insect; the other two evade the question entirely. Mr. Walsh took the ground that it was single-brooded, and the experience of the past year has convinced me that he was correct.

The Army-worm, like all other insects, hatches from an egg, and this egg is evidently deposited by the parent moth at the base of perennial grass-stalks. In Southern Missouri it hatches out about the middle of April; in the central part of the State about the first, and in the northern part about the middle of May; in Massachusetts,

about the middle of June, and in Maine about the middle of July. In every locality the worm goes underground about a month afterwards to assume the pupa or chrysalis state, and stays underground between two and three weeks. Hence, in the southern part of this State the moth appears about the fore part of June, and a month later in each successive locality as we go north, till in Maine, the period becomes the fore part of September. Of course, these dates will vary somewhat with the character of the seasons, and sometimes from local causes; but, broadly speaking, they will hold good.

The moths soon pair, and sometime during the summer and fall months, deposit their eggs in the positions already indicated. Many eggs are thus deposited in tame meadows, but there is little doubt in my mind that the great bulk of these eggs are deposited in low, damp situations, and if the fall should prove wet, instead of dry, many of them would perhaps get drowned out, and we should thus have another potent influence at work to decrease the numbers of the worm the succeeding year. I make this suggestion with all due consideration, for I have long since concluded that the instincts of insects, as of some of the higher animals, are not always sufficient to guard against all contingencies. It has been demonstrated beyond the possibility of a doubt, that the Plum Curculio deposits its eggs in fruit that overhangs water, and in other positions where the grub must inevitably perish; and certain flesh-flies are well known to deposit their eggs, by mistake, on flowers which have a putrescent smell. Darwin has remarked that a small South American bird (*Furnarius cunicularius*) which builds its nest at the bottom of a narrow, cylindrical hole, which extends horizontally several feet underground, is so incapable of acquiring any notion of thickness, that, although he saw specimens constantly flitting over a low clay wall, they continued vainly to bore through it, thinking it an excellent bank for their nests.* Many such instances of misdirected instinct might be cited, and they all lead me to believe that the female Army-worm moth would be just as likely to lay her eggs in situations where they would drown out, as in situations more favorable.

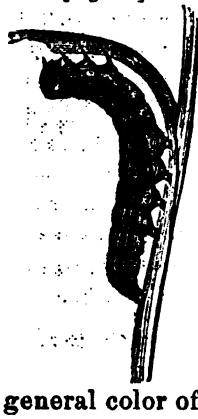
The above may be considered as the normal habit of the Army-worm; but exceptional individuals occur, perhaps one in a hundred, but demonstrably not as many as one in twenty, which lie in the chrysalis state all through the winter and do not come out in the moth state till the following spring. The proportion of those which lie over till spring is doubtless greater in the more northern States than it is with us. The great fault which Mr. Walsh made in his excellent paper on this insect, published in the Illinois State Agricultural Transactions for 1861, was, that he drew his lines too rigidly, and allowed of no exceptions to the rule which he laid down, of its single-broodedness. He also fell into an error in roughly estimating

*Voyage Round the World, p. 95.

the average life of the moth at from three to five weeks. I have often caught the moths, both in the fall and spring months, even in years when the worms themselves were unnoticed by farmers; and Dr. Levi Bartlett, formerly of Pesotum, Ills., informed me while he was practising in Chicago, that he had himself ascertained that they would sometimes live at least three months, and that he had often found them as late as October. We must also bear in mind that they do not all mature and issue from the ground together, even in the same locality; but that an interval of from six to eight weeks may intervene between the issuing of the first and last moths. With these facts before us it is easy to comprehend how some of the moths live long enough to deposit their eggs on newly sown fall grain, though grass meadows are more favorite resorts. It also becomes clear that the moths may sometimes lay their eggs before harvest upon growing grain, sufficiently high from the ground, for the egg to be carried off with the straw; and this accounts for several well authenticated instances of the Army-worm starting from stack-yards.

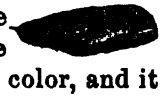
The Army-worm larva varies but little in appearance from the time it hatches to the time when it is full grown. Some specimens are a shade darker than others, but on many thousands examined, I have found the markings very uniform as represented in the annexed cut (Fig. 14). The general color is dingy black, and it is striped longitudinally as follows: On the back a broad dusky stripe; then a narrow black line; then a narrow white line; then a yellowish stripe; then a narrow sub-obsolete white line; then a dusky stripe; then a narrow white line; then a yellowish stripe; then a sub-obsolete white line; belly obscure green. Those who are more particular will find a detailed description at the end of this article.

[Fig. 14.]



The chrysalis (Fig. 15) is of a shiny mahogany-brown color, with two stiff converging thorns at the extremity, having two fine curled hooks each side of them. The general color of the moth is light reddish-brown or fawn color, and it is principally characterized by, and receives its name from, a white spot near the center of its front wings, there being also a dusky oblique line running inwardly from their tips. The accompanying illustration (Fig. 16), though darker than it should be, will show wherein it differs from the Southern Cotton Army-worm, notwithstanding the colors of the two moths are nearly alike. Our Army-worm moth was first described by the English Entomologist Haworth in the year 1810, in his *Lepidoptera Brittanica*, page 174, as *Noctua unipuncta*. Subsequently the French Entomologist Guenée

[Fig. 15.]



[Fig. 16.]

(*Noctuelites* I, p. 77) overlooking the former's description, and regarding it as a new species, named it *Leucania extranea*. Of course Haworth's name takes the precedence. It is considered a common species even in European collections, and Guenée mentions it as occurring in Brazil. A variety without the white spot occurs in Java and India, and still another, lacking the white spot, and having a dark border on the hind wings, occurs in Australia; while an occasional specimen has been captured in England. A figure is given in Stainton's Entomologist's Annual for 1860, of one captured there in 1859, but if the figure be a correct one, the specimen is much lighter than ours, and the characteristic white spot is not nearly so conspicuous.

PARASITES OF THE ARMY-WORM.

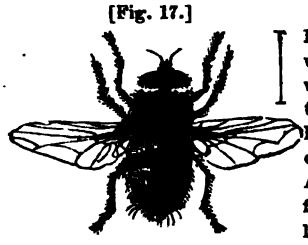
THE RED-TAILED TACHINA FLY—*Exorista leucaniæ*, Kirk.—To one who has never before seen the Army-worm in its might, the sight of the myriads as they return thwarted in their endeavors to cross, or of the living, moving and twisting mass which sometimes fills a ditch to the depth of several inches; is truly interesting. At Hannibal I was much surprised to find that fully nine worms out of every ten had upon the thoracic segments, just behind the head, from one to four minute, narrow, oval white eggs, about 0.04 inch long, attached firmly to the skin; and my companions were equally surprised when I informed them that these were the eggs of a parasite, and that every one of the worms which had such eggs attached to it, would eventually succumb to one of the maggots these eggs produced. The eggs are no doubt deposited by the mother fly just behind the head, so that the worm may not reach the young maggots when they hatch and be enabled to destroy them with its jaws. I have found several different kinds of cut-worms with just such eggs attached invariably on the back just behind the head. They are glued so strongly to the skin of the worm that they cannot be removed without tearing the flesh.

The large two-winged parasitic flies which deposited these eggs, were wonderfully numerous, buzzing around us and about the worms like so many bees, and the moment one was caught, I recognized it as the Red-tailed Tachina Fly. This is one of the most common and abundant of the Army-worm parasites, and attacks it in widely different parts of the country. I have also bred the same fly from the Variegated cut-worm (larva of *Agrotis inermis**), and a variety of it from our common large Cecropia worm, which is often found on apple and other fruit trees. It was first very briefly and imperfectly described as *Exorista leuca*[*i*]*æ*, by the late J. Kirkpatrick, in the Ohio Agricultural Report for 1860, page 358, and was subsequently much more fully described as *Senometopia* [*Exorista*] *militaris* by Mr. Walsh, in his Army-worm paper already referred to. Of course Mr. Kirkpatrick's

*First Report, p. 72.

name has the priority, but I introduce Mr. Walsh's original description of the fly and likewise the very same figure (Fig. 17) which he used to illustrate it.

[Fig. 17.]

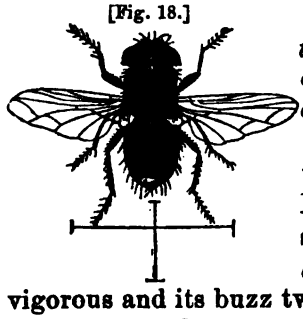


Exorista leucaniæ—Length, .25 to .40 inches, or from 6 to 10 millimetres, the females not exceeding .30 inch. Face silvery, with lateral black hairs only on the cheeks, at the top of which is a black bristle. Front, golden-olive, with a black central stripe, and lateral black convergent hairs. Occiput, dusky. Labium, brown, with yellowish hair. Maxipalps, rufous. Eyes, cinnamon-brown, covered with very short dense whitish hair. Antennæ, two basal joints, black, with black hairs; third joint, flattened, dusky, and from two and a half to three times the length of the second joint; seta, black. The entire hinder part of the head covered with dense whitish hair. Thorax glabrous, bluish-gray, lighter at the side, with four irregular black vittæ, and black hairs and bristles. Scutel, reddish-brown, whitish behind, glabrous, with black hairs and bristles. Pectus, black, glabrous, with hairs and lateral bristles. Legs, black, hairy; thighs, dark cinereous beneath; pulvilli, cinereous. Wings, hyaline; nervures, brownish; alulæ, opaque greenish-white. Abdomen, first joint black; second and third, opalescent in the middle with black and gray, and at the sides with rufous and gray; last joint, rufous, slightly opalescent at the base with gray; all with black hairs and lateral bristles. Beneath, the first joint is black, the others black, margined with rufous, all with black hairs. In the male the space between the eyes at the occiput is one-seventh of the transverse diameter of the head; in the female it is one-fourth. The colors of the abdomen sometimes "grease" and fade in the dried specimen.

Bred fifty-four specimens from about the same number of Army-worms. Described from eight males and six females. Two species, similarly marked with rufous, but generally distinct, occur at Rock Island.

Mr. Kirkpatrick also described on the same page of the Ohio Report for 1860, another species (?) to which he gave the name of *Osten Sackenii*. But upon the very face of it, this proves to be but a smaller specimen of his *leucaniæ;* for the characters on which he would build this other species, are none of them constant. He says it differs from *leucaniæ* in its smaller size; in the gray bands on the abdomen not being so distinct; in some little variation in the position of the brown, and in the *pulvill*[*i*]*æ* being more distinctly gray. Now *leucaniæ* varies from 0.25 to 0.40 inch in length; the brown on the abdomen is opalescent and varies; the pulvilli and gray abdominal markings vary far more in depth of shade than there set forth, and the abdomen in fact, if the least greasy, often loses all trace of gray.

[Fig. 18.]



THE YELLOW-TAILED TACHINA FLY, (*Exorista flavicauda*, N. Sp.)—We have another species in Missouri however, which may be called the Yellow-tailed Tachina Fly, and which differs so notably from the Red-tailed species that it may be recognized even on the wing. It is almost twice as large, and the head instead of being narrower than the thorax as in *leucaniæ* is broader. Its flight is also more vigorous and its buzz twice as loud, I represent this species at Figure 18, and draw up the following description for the scientific reader:

Exorista flavicauda, N. Sp.—Length, 0.35 to 0.50 inch. *Head* broader than thorax; face, silvery-white, the cheeks inclining to yellow, with lateral black hairs extending to near the base of

antennæ, and one stiffer and longer bristle at top of cheeks; front, dusky, ferruginous, with two rows of black converging bristles; divided by a broad depressed stripe of a brighter ferruginous color and without bristles; occiput bright ferruginous; labium ferruginous with hairs of same color; maxipalps rufous; eyes dark mahogony-brown, and *perfectly smooth;* antennæ, two basal joints rufous, with black hairs, third joint flattened, dusky, and thrice as long as second; seta, black; entire hinder part of head covered with dense white hairs. *Thorax,* more decidedly blue than in *leucaniæ, broader* (instead of narrower) in front than behind; the vittæ less distinct; scutel of same color as thorax. *Abdomen,* stout and more cylindrical than in *leuconiæ;* first joint dark bluish-gray; second, light bluish-gray, becoming darker along the middle, at sides and at lower border; third joint, like second above, but golden-gray at sides (no rufous); last joint *entirely* yellow or pale orange, with no other color and but few black bristles around anus. *Wings* more dusky than in *leucaniæ;* alulæ, opaque bluish-white. *Legs,* black; pulvilli pale yellow.

Described from one captured, 4 bred ♀. Space between eyes at occiput fully one-third the width of head.

[Fig. 19.]

To give an idea of the other parasites which attack the Army-worm, I will briefly allude to them, and transmit descriptions for the scientific reader.

The Glassy Mesochorus—*Mesochorus vitreus,* Walsh. (Fig. 19.)—Length of body .08 inch, (two millimetres,) to .13 inch, (three millimetres); the small specimens being parasitic on the Army-worm and the large ones captured in Rock Island county. Male, general color light rufous. Eyes and ocelli, black; antennæ fuscous, except toward the base. Upper surface of thorax in the larger specimen fuscous; intermediate and posterior tibiæ with spurs equal to one-fourth of their length; posterior knees slightly dusky; tips of posterior tibiæ distinctly dusky. Wings hyaline; nervures and stigma, dusky. Abdomen, a translucent yellowish-white in its central one-third; the remaining two-thirds piceous-black, with a distinct narrow yellowish annulus at the base of the third joint. In the larger specimen, which seems to be immature, the basal abdominal joint, and the articulations of the terminal joints are light rufous. Appendiculum of the abdomen composed of two extremely fine setæ, thickened at their base, whose length slightly exceeds the extreme width of the abdomen.

The female differs from the male, in the head from the mouth upwards being piceous. The thorax and pectus, in all three specimens, are also piceous-black. Abdomen as in the smaller male. Ovipositor, which is dusky, slightly exceeds in length the width of the abdomen.

The Diminished Pezomachus—*Pezomachus minimus,* Walsh, (Fig. 20.).—Length of the body

[Fig. 20.]

.07 to .10 inch., (2 to 2½ millimetres). Male, general color, piceous. Eyes black; antennæ black, except toward the base, where they are light rufous. Legs rufous; hind legs a little dusky. Abdomen narrowed; second and sometimes the third joint annulate with rufous at tip. The female differs from the male in the thorax being almost invariably rufous, and in the first three abdominal joints being generally entirely rufous, with a piceous annulus at the base of the third, which is sometimes absent. The abdomen is also fuller and wider. Ovipositor dusky, equal in length to the width of the abdomen. No vestige of wings in either sex, and the thorax contracted and divided as in *Formica.*

[Fig. 21.]

Fig. 22.]

The larvæ of this species issue from the body of the Army-worm, and spin on its skin, small cocoons symmetrically arranged side by side, and enveloped in floss (Fig. 21). It belongs to a genus of wingless Ichneumons, and in its turn is preyed upon by a small *Chalcis* fly (*Chalcis albifrons,* Walsh) which is represented at Figure 22.

The Military Microgaster—*Microgaster militaris,* Walsh, (Fig. 23).—Length 0.07 inch.

[Fig. 23.]

Head black; palpi whitish; antennæ fuscous above, light brown beneath towards the base. Thorax black, polished, with very minute punctures. Wings hyaline; nervures and stigma fuscous; lower nervure of marginal, and exterior nervure of second submarginal cellule entirely obsolete. Lower nervule of third and terminal submarginal cellule, hyaline. Legs light rufous, posterior pair, with knees and tips of tibiæ fuscous. Abdomen black, glabrous, highly polished. Ovipositor not exserted.

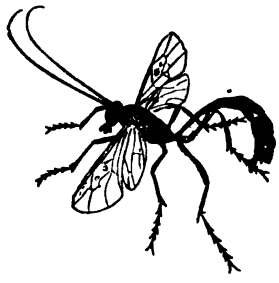
The cocoons of this little parasite are spun in irregu-

lar masses, and are so completely covered with loose white silk that as a whole they look like little pieces of fine wool attached to the back of the Army-worms. They were very numerous last year in this State, and were sent to me by several correspondents, under the supposition that they were the eggs of the Army-worm. Nothing could be more unsafe and erroneous than such a conclusion; for instead of giving birth to new generations of the Army-worm they produce the little flies which are its most deadly foes. All the numerous specimens which I bred accord exactly with the above named species. This parasite is also in its turn infested by two parasites (*Glyphe viridascens* (Fig. 24) and *Hockeria perpulcra*, Walsh), but while over 90 per cent. of Army-worms are killed by primary parasites, only about 18 per cent. of these primary parasites are destroyed by the secondary parasites.

[Fig. 24.]

THE PURGED OPHION—*Ophion purgatus*, Say*.—Body pale honey-yellow, somewhat sericeous; antennæ rather longer than the body; orbits yellow, dilated before, so as to occupy the greater part of the hypostoma; ocelli large, prominent; wings hyaline; stigma slender; first cubital cellule with two opaque, subtriangular spots; no areolet; metathorax with a single, raised, rectilinear, transverse line, near the base. Length, seven-tenths of an inch.

[Fig. 25.]



This large Ichneumon Fly (Fig. 25) has been bred from the Army-worm. The ovipositor is very short, and instead of piercing the skin of her victim as do all the other Ichneumons that have been described, the female Ophion simply attaches her egg, which is bean-shaped, by a pedicle to the skin. The footless grub which hatches from this egg does not entirely leave the egg-case, but the last joints of its body remain attached to the shell, while it reaches over, and with its sharp jaws gnaws into the side of the worm (Packard). This Ophion has been taken in Maine, New York, Massachusetts, Indiana, Illinois, Missouri and Carolina and doubtless occurs all over the United States.

THE ARMY-WORM ICHNEUMON FLY—*Ichneumon lucaniæ*, Fitch.—Dr. Fitch* has briefly described another true Ichneumon Fly under the above name, which he bred from the Army-worm.

Thus we have seven distinct and true parasites which attack this worm, and besides these, two others, undescribed, are figured in Harris's Injurious Insects (last edition p. 630), swelling the number to nine. Can we longer wonder that this dreaded foe to the farmer, never molests his crops for two successive years?

HABITS OF THE ARMY-WORM, AND SUGGESTIONS FOR ITS DESTRUCTION.

Since the great bulk of the eggs of the Army-worm are deposited in the summer and fall months in grass swamps and grass mead-

* *Ophion purgatus*, Say.=*O. lateralis*, Brullé.

*N. Y. Reports, Vol. III, p. 126.

ows, and the eggs do not hatch out till the following spring, it becomes obvious that burning over grass meadows in the winter or very early in the spring, must destroy most of the eggs. Many instances might be given where, in past years, burnt grass escaped the worm, while all the unburnt grass in the neighborhood was badly infested. and in one instance part of a meadow having been accidentally burnt and part remaining unburnt, the burnt portion in the following summer, had no Army-worms on it, and the unburnt portion swarmed with them. Thus, if you burn your meadows over annually you will seldom be troubled with this pest, and if you get your neighbors to do the same thing, and in addition will also burn all the wild grass around you, the Army-worm will never do you any damage. The remedy is so simple that all can apply it. The best time to do this burning, is, as all practical men well know, in the dead of the year, when the ground is frozen; the roots of the grass are then unharmed by the fire. Of course, ploughing the land late in the fall or late in the spring, will have the same effect as burning it, for if the eggs are turned two or three inches underground they will surely rot and fail to hatch. Here we see, as in the case of the Canker-worm, which I shall presently treat of, and as in the case of almost every other noxious insect, it is necessary accurately to investigate the habits and puculiarities of each one before we can effectually counterwork it.

During my visit to Hannibal last June, I ascertained that the worms orignated in a large 100-acre field of very rich blue-grass, belonging to Mr. W. R. Flowerree. This gentleman makes a business of fattening cattle, and intended feeding off the grass in the fall; but that same blue-grass field *had neither been pastured nor plowed the year before;* and this was the very reason why the worms originated there, as the reader will readily perceive from the foregoing account of the insect's habits.

The Army-worm when traveling will scarcely turn aside for anything but water, and even shallow water-courses will not always check its progress; for the advance columns will often continue to rush head-long into the water until they have sufficiently choked it up with their dead and dying bodies, to enable the rear guard to cross safely over. I have noticed that after crossing a bare field or bare road where they were subjected to the sun's rays, they would congregate in immense numbers under the first shade they reached. In one instance I recollect their collecting and covering the ground five or six deep all along the shady side of a fence for about a mile, while scarcely one was seen to cross on the sunny side of the same fence. Though they will nibble at clover, they evidently do not relish it, and almost always pass it by untouched. They will eat any of the grasses, and are fond of oats, rye, sorghum, corn and wheat, though they seldom devour any other part but the succulent leaves. They often cut off the ears of wheat and oats and allow them to fall to the ground, and

they are perhaps led to perform this wanton trick, by the succulency of the stem immediately below the ear. South of latitude 40° they generally appear before the wheat stalks get too hard, or early enough to materially injure it; but north of that line, wheat is generally too much ripened for their tastes, and is sometimes even harvested before the full grown worms make their advent.

I have heard of the Army-worm, sometimes passing through a wheat field when the wheat was nearly ripe, and doing good service by devouring all the chess and leaving untouched the wheat; but the following item from Collinsville, Illinois, which appeared in the *Missouri Democrat*, contains still more startling facts, and would indicate that even a foe to the farmer as determined as this, may sometimes prove to be his friend.

"HARVEST AND CROPS.—Notwithstanding the unfavorable weather, many farmers have commenced the wheat harvest. The yield in this immediate vicinity will be superabundant. Some fields were struck with rust a few days since, but the Amry-worm making its appearance simultaneously, stripped the straw entirely bare of blades and saved the berry from injury. These disgusting pests have saved thousands of dollars to farmers in this neighborhood. A few fields of corn and grass have been partially destroyed, but by ditching around fields, the worm's ravages have been confined within comparatively narrow limits."

The worms may be prevented from passing from one field to another by judicious ditching. Mr. Trabue has large meadows, separated only by a road from the blue-grass field of Mr. Flowerree; and he thought he could keep out the worms by simply making a V-shaped ditch; believing that they could not crawl over, so long as the earth crumbled. The first evening after it was dug, this ditch seemed to be effectual, and the bottom was covered with one seething, twisting mass of the worms; but a heavy rain came on in the night following, after which they crossed without difficulty. Mr. Jas. Dimmitt however, who had 80 acres of wheat adjoining the fatal blue-grass field, effectually protected it by surrounding it with a ditch which had the inner side slanting under, towards the field it was intended to protect. It was indeed most fortunate that Mr. Dimmitt had hit upon the true method in the beginning, for his wheat was yet in that soft state, in which many of the ears would have been devoured or cut off; and friend Trabue was not long in profiting by his example.

A good plan to destroy the worms which accumulate in the furrow or ditch is to burn straw in it; for the fire not only kills the worms, but makes the earth in the ditch friable and more efficient in preventing their ascent. A heavy roller passed over a field will kill almost every worm, and I have already stated that hogs and poultry will devour great numbers of them. But it is always better and easier to prevent than to cure.

LEUCANIA UNIPUNCTA, Haw.—*Larva*—General color dingy black, with the piliferous spots, placed in the normal position, but scarcely visible, though the soft hairs arising from them are easily seen with a lens. Four lateral light lines, of almost equal thickness, and at about equal

distance from each other, the two uppermost white, the two lowermost yellow; a much less distinct dorsal white line, frequently obsolete in middle of segment, and always most distinct at the divisions: a jet black line immediately above the first lateral white one, the dorsum near it, thickly mottled with dull yellow, but becoming darker as it approaches the fine dorsal white line, along each side of which it is perfectly black. Space between lateral light lines 1 and 2, dull yellow, the white lines being relieved by a darker edge; that between lines 2 and 3 almost black, being but slightly mottled along the middle; that between 3 and 4 yellow, mottled with pink-brown, and appearing lighter than that between 1 and 2. Venter greenish-glaucous, mottled and speckled with neutral color, especially near the edge of the 4th lateral line. Legs glassy and of same color as venter, those on thoracic segments with black claws, those on abdomen with a large shiny black spot on the outside. Stigmata oval, black, and placed in the 3d lateral light line. Head pale grayish-yellow, speckled with confluent fuscous dots; marked longitudinally by two dark lines that commence at the corners of the mouth, approach each other towards the centre, and again recede behind; on each side are four minute polished black eyelets, placed on a light crescent-shaped ridge, and from each side of this light ridge a dark mark extends more or less among the confluent spots above. Described from numerous average living specimens.

Imago—Front wings: general color tarnished yellowish-drab, inclining to russet, sprinkled with blackish atoms, the basal half of the costal margin being lighter than the rest. Ordinary spots brighter than rest of wing, being either fulvous or rust-red, each having ordinarily a tarnished centre, the reniform or "kidney-shaped" spot, having at its lower border a conspicuous white point, indistinctly surrounded by blackish, from which point the moth takes its name: between this point and the terminal border a transverse row of black dots (one on each vein) much arcuated above; and inside and parallel with it a less distinct row, the dots forming which, are between the nerves; an oblique dark streak, shaded off gradually posteriorly, but relieved anteriorly by the same bright color as the ordinary "spots" runs from the head of this row of dots to the apex of the wing; nerves more or less marked with white, especially towards their tips; posterior or terminal border with a row of black spots between the nerves; fringes same color as wing, with a narrow dusky line inside their middle. Hind wings partly transparent, smoky-brown, with a slight purplish lustre, the veins, lunule, and terminal border more dusky: fringes pale yellow with a dusky middle line.

Under surfaces opalescent yellowish-white, the front wings shaded with smoky-gray, the costa narrowly, and the terminal margin broadly freckled with dusky specks, the fringes and a shade near the apex flesh-color, and a distinct dusky band across their outer one-fourth, narrower but darker on the costa than in the middle of the wing: the hind wings with the lunule distinct and also speckled anteriorly and posteriorly, the basal edge of the posterior portion well defined by a series of black dots on the nerves.

Head and shoulders of same color as basal part of costa; thorax same as front wings; abdomen same as hind wings; beneath all more uniformly gray.

INSECTS INFESTING THE SWEET-POTATO.

TORTOISE-BEETLES.

(Coleoptera, Cassidæ.)

In my First Report I described eleven different and distinct insects which habitually prey on the common Irish Potato (*Salanum tuberosum*). I will now give an account of the worst insect enemies of the Sweet-Potato (*Ipomea batatus*), all of which attack that plant in this State. Before doing so, however, it will be as well to remark, that one species belonging to the same family as those which feed on the Sweet-Potato, and which is quite frequently met with in Missouri, namely, the Clubbed Tortoise-beetle (*Deloyala clavata*, Oliv. Fig. 26,)

[Fig. 26.]

feeds in reality on the common Irish Potato, thus swelling the number of insects which injuriously affect that most valuable esculent, to a round dozen. The larva of the Clubbed Tortoise-beetle is not yet known, and it is the perfect insect which has been found to attack the Potato. This is doubtless the species which Mr. Huron Burt of Williamsburg, Callaway county, referred to in the *Journal of Agriculture* of June 6th, 1868, as "a scale-like, terrapin-shaped hard insect, spread out like a flying-squirrel," that adhered tenaciously to the leaves of his potato plants. By referring to Figure 26 the reader will not be slow to learn why these beetles are called Tortoise-beetles, for the patches of dark opaque color which extend on the thin projecting semi-transparent shell of that species, remind one very forcibly of the paws of a mud-turtle. The true legs however, which, as in all other insects, are six in number, and which in this species, are so short that they scarcely reach beyond the thin shield-like crust that extends from the body, may readily be seen when the insect is turned upside down.

The insects which attack the Sweet-Potato are few in species, and belong almost entirely to this group of Tortoise-beetles. With

[Fig. 27.]

the exception of the Cucumber Flea-beetle (*Haltica cucumeris*, Harr.), figured and described on page 101 of the First Report, and a few solitary caterpillars, I have never found any other insects on this plant; but these Tortoise-beetles are of themselves sufficiently numerous in individuals and species to often entirely destroy whole fields of this esculent, and they are especially severe on the plants when newly transferred from the hot-bed.

These insects are at present included in the great CHRYSOMELA family of beetles, though they were formerly placed in a separate family (CASSIDIDÆ) by themselves, and there certainly are few groups more strongly characterized. They are almost all of a broad subdepressed form, either oval or orbicular, with the thorax and wing-covers so thoroughly dilated at the sides into a broad and flat margin, as to forcibly recall the appearance of a turtle, whence the popular name. Many have the singular power, in a greater or less degree, of changing their color when alive, and as I shall show further on, some of them shine at will with the most brilliant metallic tints.

Insects, as with the higher animals, usually void their excrement in such a manner that they effectually get rid of it, and in some cases they take pains to fling it as far from them as possible, by means of their hind legs. I have especially noticed this cleanly habit in the Oblong-winged Katydid (*Phylloptera oblongifolia*, DeGeer), of which I have had numbers breeding in confinement during the past two summers. They almost always fling their excrement straight

from them, so that if they are in a horizontal position, it adheres to the sides of their cages instead of falling to the bottom. In the great majority of insects the anus is situated at, or near the last ring, and usually on the ventral side, so that the fæces are easily left behind; but the larvæ of several species of beetles that have the peculiar habit of covering themselves with their own excrement, have the anus not on their bellies, but on their backs. The Three-lined Leaf-beetle* (*Lema trilineata*) has this habit, and is enabled to cover itself by the singular position of the anal vent which is on the back of the last segment. A closely allied European species, but belonging to a different genus (*Crioceris merdigera*) has the same habit. In this country there is also another yellowish oval jumping beetle (*Blepharida rhois*, Forster), which in the larva state covers itself with its excrement. In this instance the anus is at the end of the last segment, but it is sufficiently extensile at the will of the insect to allow of the accomplishment of the feat. This last larva is a disgusting looking thing, and I found it last year very abundant along the line of the Iron Mountain Railroad, on all three of the Sumachs—*Rhus aromatica*, *glabra* and *copalina*—preferring them in the order of their naming.

But the larvæ of the Tortoise-beetles are *par excellence* the true dung carriers, for they excel all others in this medigerous art. In the instances related above, the load is carried immediately on the back, but our Tortoise-beetles are altogether more refined in their tastes, and do not allow the dung to rest on the body, but simply shade themselves with a sort of stercoraceous parasol.

The larvæ of all the species that have been observed to feed on the Sweet-Potato are broad and flattened like the beetles, and have the margin of the body furnished with spines which are often barbed, (Fig. 27, *a*). They all belong to the genera *Cassida* and *Coptocycla*, and there are thirty-two of these spines, or sixteen on each side of the body. Four of these are situated on the prothorax, which forms two anterior projections beyond the common margin; four of them—the two anterior ones longer than the others—are on each of the two following thoracic segments, and each of the abdominal segments is furnished with but two. There are nine elevated spiracles each side superiorly, namely, one immediately behind the prothorax and eight on the abdominal segments. The fore part of the body is projected shield-like over the head, which is retractile and small.

[Fig. 28.]

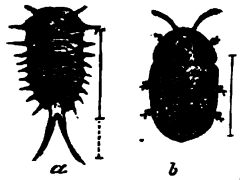
In a closely allied genus (*Chelymorpha*) to which belongs a brick-red insect with black spots (*Ch. cribraria*, Fabr., Fig. 28, pupa; 29 beetle) found upon Milkweed (*Asclepias*), and which has the body greatly rounded above, with scarcely any lateral flange, the larva, as observed by Dr. Packard, has the prickles smooth and not

[Fig. 29.]

*First Rep., p. 100.

sprangling. In another genus also (*Physonota*) to which belongs the Five-dotted Tortoise-beetle (*Ph. quinquepunctata*, Walsh & Riley, Fig. 30, *b*), and which is intermediate in form between the last named genus (*Chelymorpha*) and those with the body greatly flattened (*Cassida*, *Coptocycla*, *Deloyala*) the prickles of the larva are also smooth and only 20 in number, i. e., 10 on each side, as may be seen by referring to Figure 30, *a*. Mr. Walsh found this insect in Northern Illinois, and though we do not know upon what particular plant it feeds, yet from analogy we may infer that it subsists on some Composite flower, as other species belonging to the same genus are known to do.

[Fig. 30.]



a *b*

Almost all the larvæ of the beetles belonging to the great CHRYSOMELA family, of which the Colorado Potato Bug may serve as an example, have, besides the six legs at the anterior end of the body, an additional proleg, or protuberance which serves as such, at the posterior end; but the larvæ of our Tortoise-beetles have no such proleg, and the six anterior legs are short, thick and fleshy, and with the retractile head, give these larvæ, from a side view, as great a resemblance to a turtle as have the beetles.

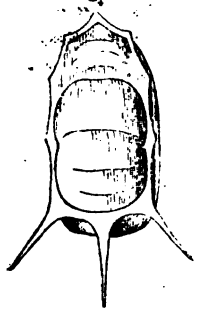
Though lacking an anal proleg, however, they are characterized by having a movable forked tail, in the shape of two long prong-like horny filaments which both spring from a broad neck situated immediately above the anus. The anus projects and curves over the back at the will of the insect, and by the aid of this fork and of some of the lateral spines, it forms the parasol of dung which so nicely protects it.

When we read of those Hottentots who cover different portions of their bodies with the uncleaned intestines of sheep and oxen, we feel shocked at such barbarism, and can scarcely comprehend how human beings can defile themselves with the like disgusting materials. Such men must be pitiable indeed, for they can have no other object than the gratification of their filthy and beastly pleasures. There is nothing so repulsive about our insect Hottentots, for the dung parasol of our Tortoise-beetles has neither offensive odor or appearance, and its true character is generally sufficiently disguised by being intermixed with the cast-off skin and prickly spines; and though those species, first referred to, which directly cover their backs, often look sufficiently unclean, we know that they thus act at Nature's bidding and for a useful purpose.

All the Tortoise-beetle larvæ which I have bred to the perfect beetle state, have come to their growth in about three weeks after hatching. They cast their skins at three successive periods, and these skins are slipped on to the fork, where in most instances they remain. On carefully detaching from a full grown larva the dung with which these skins are mixed, these three successive skins are easily recognized, the smallest being at the extremity and the largest at the base

of the fork. They are especially recognizable in the Mottled Tortoise beetle (*Cassida guttata*, Oliv., Fig. 36,) mentioned below, which removes most of its dung before each moult.

Fig. 31.



The eggs from which these larvæ hatch, are deposited singly upon the leaves, to which they are fastened by some adhesive substance. They are of irregular angular form; flat, and somewhat narrower at one end than the other; ridged above and at the sides, but smooth and obovate below. They are usually furnished with spine-like appendages, which however are sometimes entirely lacking. They look, in fact, very much like miniature specimens of those curious skate-barrows or Mermaid's purses, which are found so commonly along the sea-shore, and which are the empty egg-shells of certain kinds of Ray-fish or Skate. Those of the common Golden Tortoise-beetle (Fig. 31,) are 0.04 inch long, and of a dull, dirty white color.

The Tortoise-beetle larvæ, when full grown, fasten the last two or three joints of the body to the underside of a leaf, by means of a sticky secretion, and in about two days change to pupæ. The pupa of those species which have 32 barbed spines, is flat with usually four or five broad but thin and transparent serrated leaf-like appendages on each side of the abdomen, and the prothorax, which is greatly dilated and covers the head, is furnished around the edge with smaller barbed spines. The broad leaf-like spines at the edges of the body are bent under while the transformation is being effected, but are soon afterwards stretched stiffly out with a forward slant. The pupa loses the pronged tail, but as the old larval skin is left adhering to the terminal segments the prong of dung still protects it in most cases. The legs and antennæ are not free in this, as in the pupæ of most other beetles, but are soldered together as in the chrysalis of a butterfly, and yet it has the power of raising itself up perpendicularly upon the tail end by which it is fastened. The pupa state lasts about a week.

Having thus spoken in general terms of this anomalous group of beetles, I shall now refer more particularly to a few of the species. Most of those mentioned below infest the Sweet-Potato both in the larva and perfect beetle states. They gnaw irregular holes and when sufficiently numerous entirely riddle the leaves. They usually dwell on the underside of the leaves, and are found most abundant during the months of May and June. There must be several broods during the year, and the same species is often found in all stages, and of all sizes at one and the same time. In all probability they hybernate in the beetle state.

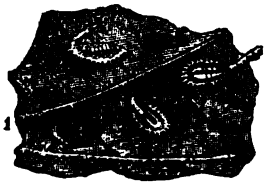
I have proved by experiment that Paris green—one part of the green to two of flour—when sprinkled under the vines, will kill these insects, though not near so readily as it does the Colorado Potato

Bug. Moreover, as these Tortoise-beetles usually hide on the under side of the leaves, and as the vines trail on the ground, it is very difficult to apply the powder without running some risk from its poisonous qualities. I therefore strongly recommend vigilance when the plants are first planted, and by the figures and descriptions given below the reader will be enabled to recognize and kill the few beetles which at that time make their appearance, and thus nip the evil in the bud. The Bermuda and Brazilian Sweet-Potato plants are more vigorous than the Nansemond, and less liable to be attacked.

THE TWO-STRIPED SWEET-POTATO BEETLE—*Cassida bivittata*,, Say.

This is the most common species found upon the Sweet-Potato, and seems to be confined to that plant, as I have never found it on any other kind. Its transformations were first described by myself in the *Prairie Farmer Annual*, for 1868, (p. 53.) The larva (Fig, 27, 2 enlarged; Fig. 32, natural size), is dirty white or yellowish-white, with a more or less intense neutral-colored longitudinal line along the back, usually relieved by an extra light band each side. It differs from the larvæ of all other known species in not using its fork for merdigerous purposes. Indeed, this fork is rendered useless as a shield to the body, by being ever enveloped, after the first moult, in the cast-off prickly skins, which are kept free from excrement. Moreover, this fork is seldom held close down to the back, as in the other species, but more usually at an angle of 45° over or from the body, thus suggesting the idea of a handle. In Kirby & Spence's Introduction (p. 426), may be found the following passage in reference to the positions in which the fork of the larvæ of these Tortoise-beetles is carried: "The instrument by which they effect this is an anal fork, upon which they deposit their excrement, and which in some is turned up and lies flat upon their backs; and in others forms different angles, from very acute to very obtuse, with their body; and occasionally is unbent and in the same direction with it." Reaumur is referred to as authority for these statements, and the language would lead us to suppose that the forks were thus variously carried by different species; but Reaumur never said anything of the sort. His language has been poorly rendered, for he distinctly referred to the different positions which the same insect could give to the fork, and I believe that the peculiarity mentioned above has never been observed in the larvæ of any other species of the genus.

[Fig. 32.]



When full fed, this larva attaches itself to the underside of the leaf, and in two days the skin bursts open on the back, and is worked down towards the tail; when the pupa, at first pale, soon acquires a dull brownish color, the narrow whitish tail, which still adheres posteriorly, being significant of the species. See (Fig. 27, 3.)

The beetle (Fig, 27, 4) is of a pale yellow, striped with black, and though broader and vastly different scientifically, still bears a gen-

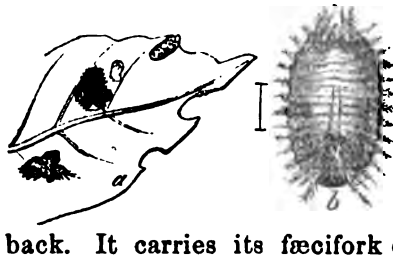
eral resemblance to the common Cucumber-beetle (*Diabrotica vittata*, Fabr.)

These beetles may be seen quite thick around young peach and apple trees quite early in the season, and a little later they venture into the trees and pair off; but as soon as the Sweet-Potato plants are set, they leave everything else for them.

THE GOLDEN TORTOISE-BEETLE—*Cassida aurichalcea*, Fabr.

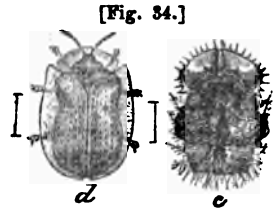
Next to the preceding species, the Golden Tortoise-beetle is the most numerous on our sweet-potatoes; but it does not confine its injuries to that plant, for it is found in equal abundance on the leaves of the Bitter-Sweet and on the different kinds of Convolvulus or Morning Glory. The lava (Fig. 33, *a*, natural size *b*, enlarged with the dung taken from the fork), is of a dark brown color, with a pale shade upon the back. It carries its fæcifork directly over the back, and the excrement is arranged in a more or less regular trilobed pattern. The loaded fork still lies close to the back in the pupa, which is brown like the larva, and chiefly characterized by three dark shades on the transparent prothorax, one being in the middle and one at each side, as represented at Figure 34, *c*.

[Fig. 33.]



The perfect beetle (Fig. 34, *d*), when seen in all its splendor, is one of the most beautiful objects that can well be imagined. It exactly resembles a piece of golden tinsel, and with its legs withdrawn and body lying flat to a leaf, the uninitiated would scarcely suppose it to be an insect, did it not suddenly take wing while being observed. At first these beetles are of a dull deep orange color, which strongly relieves the transparent edges of the wing-covers and helmet, and gives conspicuousness to six black spots, two (indicated in the figure) above, and two on each side. But in about a week after they have left the pupa shell, or as soon as they begin to copulate, they shine in all their splendor, and these black spots are scarcely noticed.

[Fig. 34.]

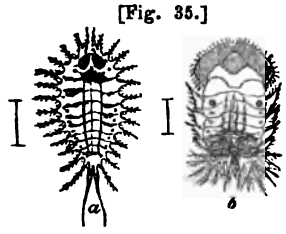


THE PALE-THIGHED TORTOISE-BEETLE—*Cassida pallida*, Herbst.

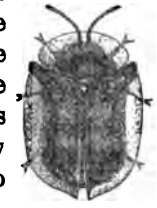
This species can scarcely be distinguished from the preceding. It is of a somewhat broader, rounder form, and differs in partially lacking the black spots on the wing-covers, and in having the thighs entirely pale yellow, while in *aurichalcea* they are black at the base. It likewise feeds upon the Sweet-Potato, and its larva differs only from that of the former, in its spines being brighter and lighter colored, and in having a dull orange head, and a halo of the same color on the anterior portion of the body.

THE MOTTLED TORTOISE-BEETLE—*Cassida guttata*,* Oliv.

[Fig. 35.]



[Fig. 36.]

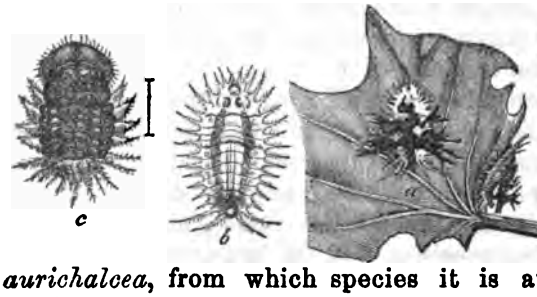


This species (Fig. 36) which is the next most common of those found on the Sweet-Potato in the latitude of St. Louis, is at once distinguished from all the others here described, by being usually black, with the shoulders black to the extreme edge of the transparent wing-covers. It is a very variable species, and is frequently more or less speckled or mottled with gold, while more rarely it has a uniform golden appearance.†

The larva, which is represented enlarged and with the dung removed at Figure 35, *a*, is of a uniform green color, with a bluish shade along the back, which shade disappears however whenever the insect has fasted for a few hours. It carries its dung in irregular broad masses, often branching as in the species next to be described. The pupa (Fig. 35, *b*,) is also of a uniform green color, with a conspicuous black ring around the base of the first abdominal pair of spiracles. Before changing to pupa and previous to each moult, this larva is in the habit of removing the dung from its fork.

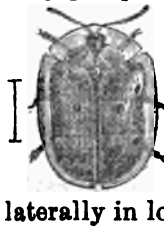
THE BLACK-LEGGED TORTOISE-BEETLE—*Cassida nigripes*, Oliv.

[Fig. 37.]



This species, which is likewise found on the Sweet-Potato, is a little the largest of those heretofore mentioned. The beetle (Fig. 38) has the power, when alive, of putting on a golden hue, but is not so brilliant as *C. aurichalcea*, from which species it is at once distinguished by its larger size and by its black legs and three large conspicuous black spots on each wing-cover. The larva (Fig. 37, *b*,) is of a pale straw color with the spines, which are long, tipped with black; and besides a dusky shade along each side of the back, it has two dusky spots immediately behind the head, and below these last, two larger crescent marks of the same color. The dung is spread in a characteristic manner, extending laterally in long shreds or ramifications. (See Fig. 37, *a*.) The pupa

[Fig. 38.]



* This insect is referred by Boheman to the genus *Coptocycla*, which differs from *Cassida* by more slender, not distinctly clavate and nearly filiform antennæ.

† This species has very probably been described under different names. It is *C. cruciata*, Fabr.; *C. signifer*, Herbst, and from larvæ found on the same batch of plants, and differing in no respect whatever, I have bred specimens which were determined by Le Conte as *C. trabeata*, Lec.

(Fig. 37, *c.*) is dark brown, variegated with paler brown as in the figure, while the spines around the edges are transparent and white.

THE PICKLE WORM—*Phacellura nitidalis*, Cramer.

(Lepidoptera, Margarodidæ.)

As long ago as the year 1828, Dr. T. W. Harris described and named the common Squash Borer (*Ægeria* [*Trochilium*] *cucurbitæ*). This borer is a true caterpillar, having sixteen legs, and very much resembling the common Peach Borer. It is hatched in the early part of summer, from eggs placed by the parent moth on the stems of the vine, close to the root. It penetrates the stem, and by devouring the pith, frequently causes the death of the vine. When full fed it retreats a short distance into the ground and forms a cocoon of a gummy substance covered with particles of earth. Within this cocoon it passes the winter, and early the next summer issues as a moth. This moth is very beautiful, with a conspicuous orange-colored body spotted with black; with the front wings blue-black and with the hind wings perfectly transparent.

Ever since the day when it was first described by Harris, this insect has been known as the Squash Borer. It seems to be confined, however, to a few of the more Eastern States, and although Mr. Wm. Klussman, of Pine Bluff, Arkansas, thinks he is troubled with this species, and has given up the growing of all winter squashes in consequence of its ravages (*Country Gentleman*, Nov. 11, 1869, page 378), yet it certainly is not of common occurrence in the Valley of the Mississippi, or we should more often hear of it.

There is, however, another borer which attacks the roots of cucurbitaceous vines, and which is but too common all over the country. I refer to that ubiquitous little pest the Striped Cucumber-beetle (*Diabrotica vittata*, Fabr.) an insect which annually destroys thousands of dollars' worth of vines in the United States, and for which remedies innumerable—some sensible, but the greater portion not worth the paper on which they are printed—are published every year in our different agricultural papers.

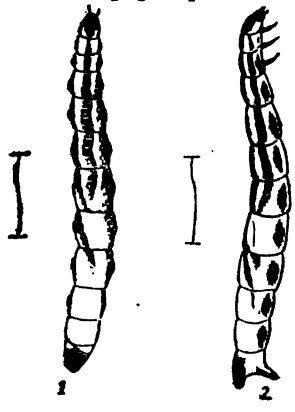
The natural history of this "Striped Bug," as it is more commonly called, was first made known in the West by Dr. Henry Shimer, of Mt. Carroll, in the *Prairie Farmer*, for August 12, 1865. But as everything pertaining to such a very common and destructive insect, cannot be too often repeated, I will here relate its habits in the briefest manner.

The parent beetles (Fig. 39) make their appearance quite early in the season, when they immediately commence their work of destruction. They frequently penetrate through the cracks that are made by the swelling and sprouting of the seeds of melons, cucumbers, or squashes, and by nipping off the young sprouts, destroy the plant before it is even out of the ground.

[Fig. 39]

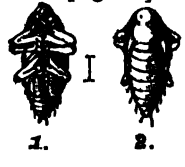
Their subsequent work when the vines have once pushed forth their leaves, is too well known to need description. Yet notwithstanding the great numbers and the persistency of these beetles, we finally succeed, with the proper perseverance and vigilance, in nursing and protecting our vines, till we think they are large enough to withstand all attacks. Besides, by this time, the beetles actually begin to diminish in numbers, and we congratulate ourselves on our success. But lo! All of a sudden, many of our vines commence to wilt, and they finally die outright. No wound or injury is to be found on the vine above ground, and we are led to examine the roots. Here we soon discover the true cause of death, for the roots are found to be pierced here and there with small holes, and excoriated to such an extent, that they present a corroded appearance. Upon a closer examination the authors of this mischief are easily detected, either imbedded in the root, or lurking in some of the corroded furrows. They are little whitish worms, rather more than a third of an inch long, and as thick as a good sized pin; the head is blackish-brown and horny, and there is a plate of the same color and consistency on the last segment. These worms are in fact the young of the same Striped Bug which had been so troublesome on the leaves earlier in the season; and that the insect may be as well known in this, its masked form, as it is in the beetle state, I present the annexed highly magnified figures of the worm (Fig. 40), No. 1 showing a back view and No. 2 a side view. The beetles, while feasting themselves on the tender leaves of the vine, were also pairing, and these worms hatched from the eggs which were deposited near the roots by the female. When the worms have become full-grown, which is in about a month after they hatch, they forsake the roots and retire into the adjoining earth, where each one, by continually turning around and around, and compacting the earth on all sides forms for itself a little cavity and in a few days throws off its larva skin and becomes a pupa. This pupa is much shorter than was the worm, and is represented enlarged in the annexed Figure 41, No. 1 ventral view, and No. 2 back view, the hair lines at the sides showing the natural size. This pupa state lasts about two weeks, at the end of which time the skin is again moulted, and the perfect beetle form assumed. All the parts of this newly developed beetle are at first soft, but after remaining motionless in its cell, till these soft parts have acquired solidity and strength, it breaks through the walls of its prison and works itself up to the light of day.

[Fig. 40.]



1 2

[Fig. 41.]



1. 2.

There are from two to three generations each year, the number varying according to the latitude, or the length of the winter. To

show however, how the different broods run into one another, and t prove how difficult it is to separate them by distinct lines, I will stat that at Kirkwood, Mo., I found this insect abundant in its three stage of larva, pupa, and beetle, during the first days of October last. An in a large jar partly filled with earth, in which I placed a number infested roots about that time, I to-day (Nov. 8, 1869) find both pup and beetles. The soil in this jar was kept as nearly as possible in th same condition as that out of doors, and as I noticed the beetl around the vines even after the first frosts, I am led to infer that, i this latitude at least, the insect often hybernates as a beetle, and n always as a pupa, as intimated by Dr. Shimer.

Of all the multifarious remedies proposed against the attacks this insect, there are none so effectual or so cheap in the end, as i closing the young vines in boxes which are open at the bottom, an covered with millinet on the top. Such boxes are made at a trivi cost, and if properly stored away each season after use, will last fo many years. Whenever other remedies must from necessity b resorted to, there is nothing better than sprinkling the vines early in the morning with Paris-green and flour, (one part of th green to four or five of flour) or with white hellebore. It of course follows, that if the beetles are effectually kept off, there will after wards be no worms at the roots.

Much complaint was made last summer, in various parts of the country, of the sudden death of cucurbitaceous vines, from some un known cause, and Henry Ward Beecher seems to have suffered in this manner, like the rest of us, but could find no worms in the roots of his vines. I know from experience that such vines are subject to a species of rot in the root—a rot not caused by insects, and for that reason the more serious, since we cannot tell how to prevent it. I have seen whole melon patches destroyed by this rotting of the roots, but in the great majority of instances where I have examined vines that had died from "some unknown cause," I have had no difficulty in either finding the worms of the "Striped Bug" yet at work on the roots, or else the unmistakable marks of their having been there. Indeed, by the time a vine dies from the effects of their gnawings and burrowings, the worms have generally become fully grown, and have hidden themselves in their little pupal cavities.

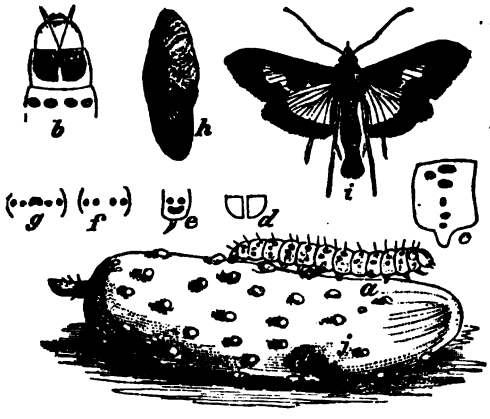
So much for the two borers which have heretofore been known to attack plants belonging to the Gourd family. We have seen how they both bore into the roots of these plants, and how one of them in the perfect state attacks the leaves. No other borers have been known to attack these plants, though the 12-Spotted Diabrotica (*D. 12-punc-*

[Fig. 42]

tata, Fig. 42), may often be found embedded in the rind of both melons, cucumbers and squashes. But we now come to a third insect which attacks plants of this same Gourd family. It neither bores into the root, nor devours the foliage, however, but seems to confine itself to the fruit; and I have

called it the Pickle Worm, from the fact of its often being found n cucumbers that have been pickled.

[Fig. 43]



At Figure 43, *a* I represent one of these worms of the natural size. They vary much in appearance, some being of a yellowish-white, and very much resembling the inside of an unripe melon, while others are tinged more or less with green. They are all quite soft and translucent, and there is a transverse row of eight shiny, slightly elevated spots on each segment, and an additional two behind the others on the back. (See Fig. 43, *c*.) Along the back and toward the head, these spots are larger than at the sides, and each spot gives rise to a fine hair. The specimen from which I obtained my first moth last summer was very light colored, and these spots were so nearly the color of the body as to be scarcely visible. The head was honey-yellow bordered with a brown line and with three black confluent spots at the palpi.

The cervical shield or horny plate on the first segment was of the same color as the body, and so transparent that the brown border of the head when retracted shone distinctly through it as at Figure 43, *b*. The breathing-holes or stigmata are small, oval, and of the same color as the body, with a fulvous ring around them. In some of the young worms the shiny spots are quite black and conspicuous. My late associate, Mr. Walsh, communicated to me the following description of such a marked specimen, from which he bred the very same species of moth as from the paler individuals: The description was taken when the worm was but half grown.

Length ¼ inch. Color pale greenish-yellow; 16 legs. Head pale rufous, the Y-shaped sutures and the mouth black. Cervical shield as in Figure 43, *d*, each half edged with black, center rufous. Marked under shield on each side as at *e*, and the same lateral marking on joints, 2 and 3. Above on joints 2 and 3 as at *f*. On joints 4–11, eight (including 2 lateral) spots transversely arranged, and behind these, two dorsal spots. Of the eight spots the two lateral ones on each side are substigmatal. Stigmata edged with dusky. Anal joint with five spots as in *g*, the middle one large and transverse. Body with some sparse long dusky hairs, 6–8 times as long as wide, a little tapered toward the head. Spins a thread. Legs and prolegs nearly immaculate.

The worms commenced to appear in the latitude of St. Louis, about the middle of July, and they continued their destructive work till the end of September. They bore cylindrical holes into the fruit and feed on its fleshy parts. They are gross feeders and produce a

large amount of soft excrement. I have found as many as four in a medium-sized cucumber, and a single worm will often cause the fruit to rot. They develop very rapidly and come to their growth in from three to four weeks. When about to transform they forsake the fruit in which they had burrowed, and drawing together portions of some leaf that lies on or near the ground, spin a slight cocoon of white silk. Within this cocoon they soon become slender brown chrysalids with the head parts prolonged, and with a very long ventral sheath which encloses the legs. If it is not too late in the season the moths issue in from eight to ten days afterwards. The late individuals, however, pass the winter within their cocoons; though, from the fact that some moths come out as late as November, I infer that they may also winter over in the moth state.

The moth produced by this worm (of which Figure 43, *i*, represents the male) is very strikingly marked. It is of a yellowish-brown color, with an iris-purple reflection, the front wings having an irregular, semi-transparent, dull golden-yellow spot, not reaching their front edge, and constricted at their lower edge; and the hind wings having their inner two-thirds of this same semi-transparent yellow. The under surfaces have a more decided pearly lustre. The thighs, the breast, and the abdomen below, are all of a beautiful silvery-white, and the other joints of the long legs are of the same tawny or golden-yellow as the semi-transparent parts of the wings. The abdomen of the female terminates in a small flattened black brush, squarely trimmed, and the segment directly preceding this brush is of a rust-brown color above. The corresponding segment in the male is, on the contrary, whitish anteriorly and of the same color as the rest of the body posteriorly, and he is, moreover, at once distinguished from the female, by the immense brush at his tail, which is generally much larger than represented in the above figure, and is composed of narrow, lengthened (*ligulate*) scales, which remind one of the petals of the common English daisy, some of these scales being whitish, some orange, and others brown. This moth was described nearly a century ago by Cramer, under the scientific name of *Phak[c]ellura nitidalis*, and it may be known in English as the Neat Cucumber Moth. The genus to which it belongs is characterized chiefly by the partly transparent wings, and by the immense scaly brush of the males. The antennæ are long, fine and thread-like, those of the male being very finely ciliated; the abdomen extends beyond the wings, and the legs are very long and slender. The species are for the most part exotic, and the larvæ of all of them, so far as known, feed on cucurbitaceous plants.

The following item, taken from a St. Louis paper, though somewhat facetious, will give an idea of the extent of the injuries caused by this insect in that vicinity:

What's the matter with the cucumbers? A lady of our acquaintance, the other day, sent to market to purchase some cucumbers for

pickling purposes. They were placed in a vessel to be washed, previous to being put in the brine. It was then observed that small, singular looking worms clung in the 'wrinkles' on the outside of some of the cucumbers. These were washed off, when accident led to the discovery that inside every one of the cucumbers was secreted a white, corrugated, creeping thing, from half an inch to over an inch in length, resembling in miniature a rattlesnake's rattles, and not a very pretty object to look upon. It turns out that nearly, if not all the cucumbers brought to this market this season are affected the same way. These worms certainly do not look very good to eat, in the unpickled form; but we are told that they are entirely harmless in the natural state, and probably add to the pungency and crispness of the gherkin when forming part of the chow-chow, and other relishes which grace every well regulated square meal. Like the mites in the cheese, which with some are supposed to testify to the good quality and healthfulness of the article, we suppose worms in the pickles may fairly be considered a question of taste; but, if it is not obtrusive, we will add that we do not believe they are to *our* taste or digestion, and, if it is all the same to the cucumber merchants, we would rather not take any in our'n.

In Missouri, I have myself found this insect quite abundant in various parts of St. Louis and Jefferson counties, and the cucumbers seem to have fared worse than the melons. That it was not confined to these two counties, is also proved by the following communication which appeared in the *Journal of Agriculture*, of September 10, 1869:

Pleasant Hill, Mo., September 2, 1869.—Last winter, seeing many glowing accounts of the "Alton Large Nutmeg Melon," I sent to Mr. Barler and procured some, paying thirty cents an ounce for them; planted and worked well; during August, had some melons. The first few tasted right well, but soon my "Green Citron" cantelope ripening, the difference in the taste of the two was found to be so great that we could not eat the Alton Nutmeg. Furthermore, the latter had worms in them—the larvæ of some insect—eating into nearly every one. The Green Citron was rarely attacked by them. I have raised this variety of Green Citron for several years, and would not give one of the melons for a dozen Alton Nutmegs. It is sweet, juicy and very rich in taste. When a boy, I can remember a cantelope that was raised by my father, called "Persian." I think the Green Citron probably derived from it.

Yours, G. C. BROADHEAD.

In Illinois, it was very destructive around Alton, during the month of August; for, on July 19th, I received specimens from G. W. Copley, of that place, and found (Sept. 2, 1869), on visiting Mr. O. L. Barler's large melon fields, that fully three-fourths of his melons had been injured by it. Since then, several other Alton men have assured me that it was equally destructive with them. It also occurred around Springfield, for Mr. P. M. Springer sent to me, the last of October, a specimen of the moth which he had bred from a cucumber-boring worm; while Mr. Walsh also found it abundant at Rock Island, in the northern part of that State.

In Michigan, as I learned from Mr. W. B. Ransom, of St. Joseph,

it greatly injured the cucumbers and melons around that place; and Mr. Glover, of the Department of Agriculture, informs me that he has found the worm on Squash, in Florida, in July. Thus it appears that this Pickle Worm has a wide range, and that last summer it simultaneously fell upon the cucumbers and melons in widely different parts of the country. Of course, in making pickles, the worm is pickled with the cucumber, and we shall consequently continue to hear startling stories about the worms in the pickles.

This insect, so far as I can ascertain, has never before been figgured or described in this country; nor can I find any mention made of its destructive work in past years. I am, therefore, led to the conclusion that it was never numerous or destructive enough in the past, to attract attention. This fact becomes the more astonishing, when we consider how wide-spread and general its injuries were the past summer; and it furnishes another illustration of the sudden and enormous increase, in some particular year, of an insect which had scarcely ever before been noticed.

The system of Nature is so complicated, and every animal organism is subject to so many influences that affect its increase or decrease, that we are not surprised at the fluctuation in the relative numbers of any particular species. The "Struggle for Life," as expounded by Darwin, is no where more effectual in bringing about changes than in insect life. We are at first a little puzzled to account for the sudden advent, and the equally sudden departure of such insects as the Army-worm, Chinch Bug, Wheat Midge, etc., but when we once acquire a just conception of the tangled web in which every insect is involved, we wonder rather that the balance is so well kept.

Our Pickle-worm is an indigenous species, and has, doubtless, existed in some part or other of the country from time immemorial; and now that its habits are recorded and its history made known, I should not be at all surprised to learn that individuals have suffered from it in years gone by. The French Entomologist, Guenée, gives as its food-plant, a species of potato, and it is just possible that it may not always have fed upon the same plants on which it was found last summer. At all events, let us hope that it will disappear as suddenly as it appeared; but should it occur in great numbers again next year, the foregoing account will enable those who grow melons, cucumbers or squashes, to understand their enemy, and to nip the evil in the bud, by carefully overhauling their vines early in the summer, and destroying the first worms that appear, either by feeding the infested fruit to hogs or cattle, or by killing the worms on the spot. I know from experience that this worm when pickled with the cucumber, does not in the least affect its taste, and is not in the least injurious to the human system; but as it is not very desirable food, pickles should always be halved, before being brought to the table, especially if they were gathered from a field or garden known to be infested.

INSECTS INJURIOUS TO THE GRAPE-VINE.

Under this head, I shall continue the series of articles begun in my First Report, in order to give the grape-growers of our State a thorough understanding of their insect enemies, and thus lessen the hindrances and drawbacks to viticulture—that most important and pleasant part of rural industry, which is increasing with such unprecedented rapidity.

THE HOG-CATERPILLAR OF THE VINE—*Chærocampa pampinatrix*, Sm. & Abb.*

[Lepidoptera, Sphingidæ.]

[Fig. 44.]

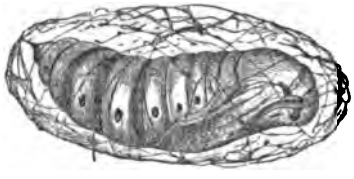
Of the large solitary caterpillars that attack the Grape-vine, this is by far the most common and injurious in the Mississippi Valley. I have frequently found the egg of this insect glued singly to the underside of a leaf. It is 0.05 inch in diameter, perfectly round and of a uniform delicate yellowish-green color. The young worm which hatches from it, is pale green, with a long straight horn at its tail; and after feeding from four to five weeks it acquires its full growth, when it presents the appearance of Figure 44, the horn having become comparatively shorter and acquired a posterior curve.

This worm is readily distinguished from other grape-feeding species by having the third and fourth rings immensely swollen, while the first and second rings are quite small and retractile. It is from this peculiar appearance of the fore part of the body, which strikingly suggests the fat cheeks and shoulders and small head of a blooded hog, that it may best be known as the Hog-caterpillar of the vine. The color of this worm when full grown is pea-green, and it is wrinkled transversely and covered with numerous pale-yellow dots, placed

*Synonyms, *Sphinx*, [*Darapsa*] *myron*, Cramer; *Otus cnotus*, Huebner. Of the four different generic names under which this species has been classified, "*Sphinx*" is a general term for all the Hawk-moths and refers to the sphinx-like attitude often assumed by their larvæ; "*Chærocampa*" is derived from two Greek words which mean "Hog-caterpillar;" and "*Darapsa*" and "*Otus*" are gibberish Of the three different specific names, "*Myron*" refers to an ancient Greek who bore this appellation, "*cnotus*" is pure unadulterated gibberish, and "*pampinatrix*" is from the Latin and signifies "a female vine-pruner." Both Harris and Fitch describe this insect under the name of *Chærocampa pampinatrix*; and this, as the appellation best known to our grape-growers, and the most characteristic of the habits of the species, I should prefer to retain, although no doubt, according to the strict Law of Priority, the specific name of *Myron* ought to be employed. Mr. Walker, Dr. Clemens and Dr. Morris call this species "*Darapsa Myron*," and Mr. Grote calls it "*Otus Myron*." By ringing the changes with sufficient ingenuity upon the four generic and the three specific names, we may obtain no less than twelve different names for this one insect!

in irregular transverse rows. An oblique cream-colored lateral band, bordered below with a darker green, and most distinct on the middle segments, connects with a cream-colored subdorsal line, which is bordered above with darker green, and which extends from the head to the horn at the tail. There are five and often six somewhat pale yellow triangular patches along the back, each containing a lozenge-shaped lilac-colored spot. The head is small, with yellow granulations, and four perpendicular yellow lines, and the spiracles or breathing holes are orange-brown. When about to transform, the color of this worm usually changes to a pinkish-brown, the darker parts being of a beautiful mixture of crimson and brown. Previous to this change of color Mr. J. A. Lintner, of Schoharie, New York, has observed the worm to pass its mouth over the entire surface of its body, even to the tip of its horn, covering it with a coating of apparently glutinous matter—the operation lasting about two hours.* Before transforming into the pupa or chrysalis state, it descends from the vine, and within some fallen leaf or under any other rubbish that may be lying on the ground, forms a mesh of strong brown silk, within which it soon changes to a chrysalis (Fig. 45.) of a pale, warm yellow, speckled and spotted with brown, but characterized chiefly by the conspicuous dark brown spiracles and broad brown incisures of the three larger abdominal segments.

[Fig. 45.]



[Fig. 46.]

The moth (Fig. 46) which in time bursts from this chrysalis, has the body and front wings of a fleshy-gray, marked and shaded with olive-green as in the figure, while the hind wings are of a deep rust-color, with a small shade of gray near their inner angle.

This insect is, in northerly regions, one-brooded, but towards the south two-brooded, the first worms appearing, in the latitude of St. Louis, during June and July, and giving out the moths about two weeks after they become chrysalids, or from the middle of July to the first of August. The worms of the second brood are full grown in September, and passing the winter in the chrysalis state, give out the moths the following May. On one occasion I found at South Pass, Illinois, a worm but one-half grown and still feeding as late as October 20th, a circumstance which would lead to the belief that at

*Proc. Ent. Soc.. Phil., III, p. 663.

points where the winters are mild, they may even hybernate in the larva state.

This worm is a most voracious feeder, and a single one will sometimes strip a small vine of its leaves in a few nights. According to Harris it does not even confine its attacks to the leaves, but in its progress from leaf to leaf, stops at every cluster of fruit, and either from stupidity or disappointment, nips off the stalks of the half-grown grapes and allows them to fall to the ground untasted. It is fortunate for the grape-grower, therefore, that Nature has furnished the ready means to prevent its ever becoming excessively numerous, for I have never known it to swarm in very great numbers. The obvious reason is, that it is so freely attacked by a small parasitic Ichneumon fly—belonging to a genus (*Microgaster*) exceedingly numerous in species—that three out of every four worms that we meet with will generally be found to be thus victimized. The eggs of the parasite are deposited within the body of the worm, while it is yet young, and the young maggots hatching from them feed on the fatty parts of their victim. After the last moult of a worm that has been thus attacked, numerous little heads may be seen gradually pushing through different parts of its body; and as soon as they have worked themselves so far out that they are held only by the last joint of the body, they commence forming their small snow-white cocoons, which stand on ends and present the appearance of Figure 47. In about a week the fly (Fig. 48, *a*, magnified; *b*, natural size) pushes open a little lid which it had previously cut with its jaws, and soars away to fulfil its mission. It is one of those remarkable and not easily explained facts, which often confront the student of Nature, that, while one of these Hog-caterpillars in its normal and healthy condition may be starved to death in two or three days, another, that is writhing with its body full of parasites will live without food for as many weeks. Indeed, I have known one to rest for three weeks without food in a semi-paralyzed condition, and after the parasitic flies had all escaped from their cocoons, it would rouse itself and make a desperate effort to regain strength by nibbling at a leaf which was offered to it. But all worms thus attacked succumb in the end, and I cannot conclude this article to better advantage than by reminding the Grape-grower, that he should let alone all such as are found to be covered with the white cocoons above illustrated, and not, as has been often done, destroy them under the false impression that the cocoons are the eggs of the worm. Numbers of these little white cocoons are sent to me every year under the supposition that they are eggs, and no doubt many of them get destroyed by the very persons who ought to cherish them.

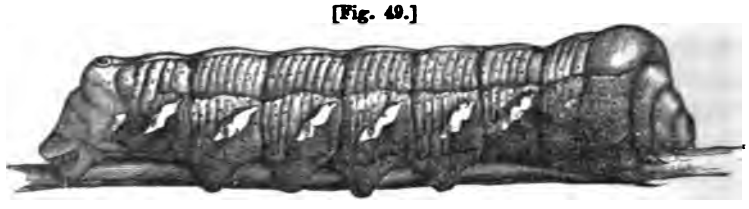
[Fig. 47.]

[Fig. 48.]

THE ACHEMON SPHINX—*Philampelus achemon*, Drury.*

(Lepidoptera, Sphingidæ.)

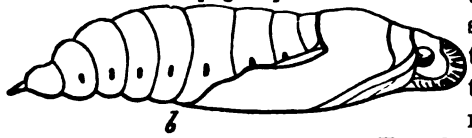
[Fig. 49.]



a

This is another of the large Grape-vine-feeding insects, belonging to the great *Sphinx* family, and which may be popularly known as the Achemon Sphinx. It has been found in almost every State where the Grape is cultivated, and also occurs in Canada. It feeds on the American Ivy (*Ampelopsis quinquefolia*, with as much relish as on the Grape-vine, and seems to show no preference for any of the different varieties of the latter. It is, however, worthy of remark, that both its food-plants belong to the same botanical Family.

[Fig. 50.]



b

The full grown larva (Fig. 49.) is usually found during the latter part of August and fore part of September. It measures about 3½ inches when crawling, which operation is effected by a series of sud-

[Fig. 51.]

c

den jerks. The third segment is the largest, the second but half its size and the first still smaller, and when at rest the two last mentioned segments are partly withdrawn into the third as shown in the figure. The young larva is green, with a long slender reddish horn rising from the eleventh segment and curving over the back, and

*The synonyms for this insect are *Sphinx Crantor*, Cramer, and *Pholus crantor*, Huebner. The genus *Philampelus*—meaning literally "fond of the vine"—was erected by Harris to include this and the next species.

though I have found full grown specimens that were equally as green as the younger ones, they more generally assume a pale straw or reddish-brown color, and the long recurved horn is invariably replaced by a highly polished lenticular tubercle. The descriptions extant of this worm are quite brief and incomplete. The specimen from which my drawing was made, was of a pale straw color which deepened at the sides and finally merged into a rich vandyke-brown. A line of a *feuille-morte* brown, deep and distinct on the anterior part, but indistinct and almost effaced on the posterior part of each segment, ran along the back, and another line of the same color, continuous, and with its upper edge fading gradually, extended along each side. The six scalloped spots were cream-colored; the head, thoracic segments and breathing-holes inclined to flesh-color, and the prolegs and caudal plate were deep brown. The worm is covered more or less with minute spots which are dark on the back but light and annulated at the sides, while there are from six to eight transverse wrinkles on all but the thoracic and caudal segments.

The color of the worm, when about to transform, is often of a most beautiful pink or crimson. The chrysalis (Fig. 50) is formed within a smooth cavity under ground. It is of a dark shiny mahogany-brown color, shagreened or roughened, especially at the anterior edge of the segments on the back.

Unlike the Hog-caterpillar of the Vine, just described, this insect is everywhere single-brooded, the chrysalis remaining in the ground through the fall, winter and spring months, and producing the moth towards the latter part of June. I rather incline to believe however that there may be exceptions to the rule in southerly latitudes, and that in such latitudes it may sometimes be double-brooded; for I have known the moth to issue near St. Louis during the first days of August, and have this very year found two worms in the same locality as late as the 25th of October, neither of which was quite full grown, though the leaves on the vines upon which they were found had almost all fallen. Apparently such premature development of *Sphinx* moths is a well-known occurrence among the different European species; for Chas. Darwin remarks that "a number of moths, especially *Sphinx* moths, when hatched in the autumn out of their proper season, are completely barren; though the fact of their barrenness is still involved in some obscurity.*

The moth (Fig. 51), is of a brown-gray color variegated with light brown, and with the dark spots, shown in the figure, deep brown. The hind wings are pink with a dark shade across the middle, still darker spots below this shade, and a broad gray border behind. I once had an excellent opportunity of observing how it burst open the chrysalis shell, for while examining a chrysalis, the moth emerged. By a few sudden jerks of the head, but more especially by friction

*See *Variation of Animals and Plants, etc.*, II, pp. 157-8, English Edition, and the references there given in the foot-note.

with the knees of the middle pair of legs, it severed and ruptured the thin chrysalis shell, and the very moment the anus touched the ruptured end, the creamy fluid usually voided by newly-hatched moths was discharged.

I have never found any parasite attacking this species, but its solitary habit and large size make it a conspicuous object, and it is easily controlled by hand, whenever it becomes unduly numerous upon the Grape-vine.

THE SATELLITE SPHINX—*Philampelus satellitia*, Linn.*

(Lepidoptera Sphingidæ.)

Like the preceding insect this one occurs in almost every State in the Union. It also bears a strong resemblance to the Achemon Sphinx, and likewise feeds upon the *Ampelopsis* as well as upon the Grape-vine; but the worm may readily be distinguished from the former by having five cream-colored spots each side, instead of six, and by the spots themselves being less scalloped.

[Fig. 52.]

In the latitude of St. Louis, this worm is found full grown throughout the month of September, and a few specimens may even be found as late as the last of October. The eggs of this species, as of all other Hawk-moths (*Sphinx* family) known to me, are glued singly to the leaf of the plant which is to furnish the future worm with food. When first hatched, and for sometime afterwards, the larva is green, with a tinge of pink along the sides, and with an immensely long straight pink horn at the tail. This horn soon begins to shorten, and finally

*The synonyms for this insect are *Sphinx lycaon*, Cramer; *Pholus lycaon*, Huebner, and *Daphnis pandorus*, Hübner. Mr. A. Grote (Proc. Ent. Soc. Phil., I, p. 60), believes that the *Sphinx lycaon* of the authors above quoted, is distinct from *S. Satellitia*, Linn., and would fain "eliminate" a third species (*posticatus*). For reasons which it would be tedious to give here, I prefer to regard *lycaon* as a variety of *satellitia*.

curls round like a dog's tail, as at Figure 52, *c*. As the worm grows older it changes to a reddish-brown, and by the third moult it entirely loses the caudal horn.

When full grown, it measures nearly four inches in length, and when crawling, appears as at Figure 52, *a*. It crawls by a series of sudden jerks, and will often fling its head savagely from side to side when alarmed. Dr. Morris* describes the mature larva as being green, with six side patches; but though I have happened across many specimens of this worm during the last seven years, I never once found one that was green after the third moult; nor do I believe that there are ever any more than five full-sized yellow spots each side, even in the young individuals. The specimen from which the above figure was made, occurred in 1867, at Hermann, Missouri, in Mr. Geo. Husmann's vineyard. The back was pinkish, inclining to flesh-color; the sides gradually became darker and darker, and the five patches on segments 6—10 inclusive, were cream-yellow with a black annulation, and shaped as in the figure. On segments 2, 3, 4, 5 and 6, were numerous small black dots, but on each of the following five segments there were but two such dots. A pale longitudinal line ran above the yellow patches, and the head and first joint were uniformly dull reddish-brown.

The most common general color of the full-grown worm is a rich velvety vinous-brown. When at rest, it draws back the fore part of the body, and retracts the head and first two joints into the third (see Fig. 52, *b*), and in this motionless position it no doubt manages to

[Fig. 53.]

escape from the clutches of many a hungry insectivorous bird. Dr. Morris, copying perhaps after Harris, erroneously states that the three anterior joints, together with the head, are retracted into the *fourth*, and Mr. J. A. Lintner† makes the same false assertion. It is

*Synopsis of N. A. *Lepidoptera*, p. 178.

†Proc. Ent. Soc. Phil., III, p. 659.

the *third* segment in this species, as well as in the Achemon Sphinx which is so much swollen, and into which the head and first two segments are retracted.

When about to transform, the larva of our Satellite Sphinx enters a short distance into the ground, and soon works off its caterpillar skin and becomes a chrysalis of a deep chestnut-brown, and very much of the same form as that of the Achemon Sphinx, figured on page 74. The moth (Fig. 53), makes its appearance in June of the following year, though it has been known to issue the same year that it had existed as larva. In this last event, it doubtless becomes barren, like others under similar circumstances, as was shown on page 75. The colors of the moth are light olive-gray, variegated as in the figure with dark olive-green. The worms are easily subdued by hand-picking.

THE ABBOT SPHINX—*Thyreus Abbotii*, Swainson.

(Lepidoptera, Sphingidæ.)

This is another of the large Grape-feeding insects, occurring on the cultivated and indigenous vines and on the Virginia Creeper, and having in the full-grown larva state, a polished tubercle instead of a horn at the tail. Its habitat is given by Dr. Clemens, as New York, Pennsylvania, Georgia, Massachusetts, and Ohio; but though not so common as the Sphinx moths previously described, yet it is often met with both in Illinois and Missouri. The larva which is represented in the upper part of Figure 54, varies considerably in appearance. Indeed, the ground-color seems to depend in a measure on the sex, for Dr. Morris describes this larva as reddish-brown with numerous patches of light-green, and expressly states that the *female* is of a uniform reddish-brown, with an interrupted dark brown dorsal line and transverse striæ. I have reared two individuals which came to their growth about the last of July, at which time they were both without a vestige of green. The ground-color was dirty yellowish, especially at the sides. Each segment was marked transversely with six or seven slightly impressed fine black lines, and longitudinally with wider

[Fig. 54.]

non-impressed dark brown patches, alternating with each other, and giving the worm a checkered appearance. These patches become more dense along the subdorsal region, where they form two irregular dark lines, which on the thoracic segments become single, with a similar line between them. There was also a dark stigmatal line with a lighter shade above it, and a dark stripe running obliquely downwards from the posterior to the anterior portion of each segment. The belly was yellow with a tinge of pink between the prolegs, and the shiny tubercle at the tail was black, with a yellowish ring around the base. The head, which is characteristically marked, and by which this worm can always be distinguished from its allies—no matter what the ground-color of the body may be—is slightly roughened and dark, with a lighter broad band each side, and a central mark down the middle which often takes the form of an x. This worm does not assume the common Sphinx attitude of holding up the head, but rests stretched at full length, though if disturbed it will throw its head from side to side, thereby producing a crepitating noise.

The chrysalis is formed in a superficial cell on the ground; its surface is black and roughened by confluent punctures, but between the joints it is smooth and inclines to brown; the head-case is broad and rounded, and the tongue-case is level with the breast; the tail terminates in a rough flattened wedge-shaped point, which gives out two extremely small thorns from the end.

The moth (Fig. 54, below) appears in the following March or April, there being but one brood each year. It is of a dull chocolate or grayish-brown color, the front wings becoming lighter beyond the middle, and being variegated with dark brown as in the figure; the hind wings are sulphur-yellow, with a broad dark brown border breaking into a series of short lines on a flesh-colored ground, near the body. The wings are deeply scalloped, especially the front ones, and the body is furnished with lateral tufts. When at rest, the abdomen is curiously curved up in the air.

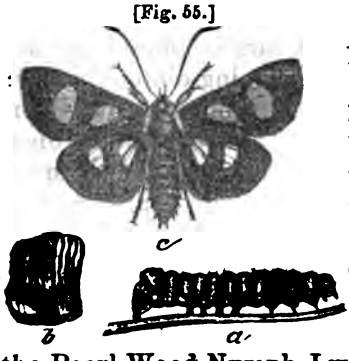
THE BLUE CATERPILLARS OF THE VINE.

Besides these large Sphinx caterpillars, every grape-grower must have observed certain so-called "Blue Caterpillars," which, though far from being uncommon, are yet very rarely sufficiently numerous to cause alarm, though in some few cases they have been known to strip certain vines. There are three distinct species of these blue caterpillars, which bear a sufficiently close resemblance to one another, to cause them to be easily confounded. The first and by far the most common with us is the larva of

THE EIGHT-SPOTTED FORESTER—*Alypia octomaculata*, Fabr.

(Lepidoptera, Zygænidæ.)

[Fig. 55.]



At Plate I, Figure 18 of my First Report, the male of this moth is illustrated by the side of its supposed larva, Figure 19 of the same Plate. In the text (pp. 136–7) I expressed some doubts as to whether this last was the rightful larva of the Eight-spotted Forester, and as I have since reared several moths from the larva state, and ascertained that the worm there figured does not belong to the Eight-spotted Forester, but in all probability to the Pearl Wood Nymph, I will now give the characters of these three different blue caterpillars, so that they may readily be distinguished hereafter.

The larva of the Eight-spotted Forester may often be found in the latitude of St. Louis as early as the beginning of May, and more abundantly in June, while scattering individuals (probably of a second brood) are even met with, but half-grown, in the month of September. The young larvæ are whitish with brown transverse lines, the colors not contrasting so strongly as in the full-grown specimens, though the black spots are more conspicuous. They feed beneath the leaves and can let themselves down by a web. The full-grown larva often conceals itself within a folded leaf. It is of the form of Figure 55, *a*, and is marked transversely with white and black lines, each segment having about eight light and eight dark ones. The bluish appearance of this caterpillar is owing to an optical phenomenon from the contrast of these white and black stripes. The head and the shield on the first segment are of a shiny bright deep orange color, marked with black dots, and there is a prominent transverse orange-red band, faint on segments 2 and 3; conspicuous on 4 and 11 and uniform in the middle of each of the other segments. In the middle segments of the body each orange band contains eight black conical elevated spots or tubercles, each spot giving rise to a white hair. These spots are arranged as in the enlarged section shown in the engraving (Fig. 55, *b*), namely, four on each side as follows: the upper one on the anterior border of the orange band, the second on its posterior border, the third just above spiracles on its anterior border—each of the three interrupting one of the transverse black lines—and the fourth, which is smaller, just behind the spiracles. The venter is black, slightly variegated with bluish-white, and with the orange band extending on the legless segments. The legs are black, and the false-legs have two black spots on an orange ground, at their outer base; but the characteristic feature, which especially distinguishes it from the other two species, is a lateral white wavy band—

obsolete on the thoracic segments, and most conspicuous on 10 and 11—running just below the spiracles, and interrupted by the transverse orange band.

I quote here Harris's full description of this larva (*Correspondence*, p. 286), as it agrees with mine, except in giving the number of transverse black lines as 6 on each segment, instead of 8, from the fact that he does not include the two which border the orange band, on account of their being interrupted. I have preferred to consider each segment of this worm as 8-banded, to distinguish it more readily from the other two species, which have respectively only six and four. "Length, when at rest, one inch and two-tenths, very pale blue, transversely banded with orange on the middle of each segment, the bands dotted with small black points, producing hairs, and surmounted by black lines, and between each of the bands six transverse black lines. A large, irregular, white spot on the side of the tenth and eleventh segments, and a series of smaller white spots on each of the other segments except the first three. Head orange dotted with black. Legs blackish externally. The full-grown, have a decidedly bluish tinge, entirely owing, however, to an optical phenomenon from the contrast of the white with the transverse black lines. The head is of a pale dirty orange or rusty yellow, with about eight black dots on each side; [about 10 large and 14 small dots in all,] a semicircular plate on the top of the first segment and the anal valves are pale orange dotted with black. There is a transverse series of black dots on the second and third segments, without an orange band. Each of the other segments is transversely banded with orange and dotted with black; the dots being in two alternate rows, and all of them emitting distinct, long whitish hairs. [The anterior dots on the back of segments 4, 5 and 6 and the posterior ones on 11, are considerably larger than the rest]. Between each of the bands there are six slender, continuous, black transverse lines. The points are also connected by interrupted black lines. Legs at base orange, black externally and at tip, except the anal pair which are orange, dotted with black. The large white lateral spot is common to the side of the tenth and eleventh segments. The other lateral white spots are situated immediately behind the bands on the fourth, fifth, sixth, seventh, eighth and ninth segments, the anterior spots being largest; and thence they diminish to the ninth, while again the posterior spot is very large and very distinct. The orange bands are interrupted on the top of the seventh, eighth and ninth segments."

This larva transforms to chysalis within a very slight cocoon formed without silk, upon, or just below the surface of the earth, and issues soon after, as a very beautiful moth of a deep blue-black color, with orange shanks, yellow shoulder-pieces, each of the front wings with two large light yellow spots, and each of the hind wings with two white ones. The illustration (Fig. 55, *c*) represents the female, and the male differs from her in having the wing spots larger, and in having a conspicuous white mark along the top of his narrower abdomen.

I have on one or two occasions known vines to be partly defoliated by this species, but never knew it to be quite so destructive as it is represented in the following communication from Mr. W. V. Andrews, of New York city, which I take from the February (1869) nummer of the *American Naturalist:*

"That a man should desire to raise his own Isabellas is laudable and praiseworthy; and I see no reason why such desire should exist exclusively in the breasts of our bucolic friends. The inhabitants of New York, as a general thing, clearly are of the same opinion, as is evidenced by the number of grape-vines ornamenting the doors and trellis-work of the houses of our citizens; not, of course, in the benighted regions of Wall street, but up-town; say from Sixteenth street northward. A friend of mine residing on Thirty-fourth street, showed me, in March last, a very fine vine, which he calculated would produce him sundry pounds of choice grapes, and in the pride of his

heart he invited me to "call along" occasionally, and feast my ey on the gradual development of the incipient bunches. Thinking th August would be a good month for my visit, I "called along," wo dering in my mind whether my friend would, when the time of ri grapes came, desire me to help myself out of his abundance; whether he intended to surprise me with a little basket of ni bunches, garnished with crisp, green leaves. The first glance at th grape-vine banished all doubts on this point. There were an abu dance of bunches on the vine, in a rather immature condition, course, but of foliage there was not a trace. Of course I expresse my surprise, though, for certain reasons, I felt none; and asked m friend why he selected a species of vine for shelter, ornament, and us which produced no foliage. He rebuked my ignorance pretty sharpl and told me that a few weeks before, the vine was covered with leave but, for some inexplicable reason, they had all disappeared—eaten, h guessed, by something. He guessed right. There were at least hundred of the larvæ of *A. octomaculata*, the rear guard of a migh host, wandering about the branches, apparently for the purpose o making sure that no little particle of a leaf was left undevoured. Pretty little things they were, with harmoniously blended colors of black, yellow and blue, but so terribly destructive! I had the curiosity to walk through all the streets to the east of Third avenue, as low as Twenty-third street, and every vine was in the same predicament. If grape leaves, instead of fig leaves, had been in request for making aprons, and one *Alypia* had been in existence at the time, I doubt if in the whole Garden of Eden enough material would have been found to make a garment of decent size. The destruction of the crop for 1868 was complete.

"This was bad. But it was not half so bad as the helpless ignorance which possessed nearly all of the unfortunate owners of vines. Scarcely one that I conversed with had the remotest idea of the cause of the disaster, and when I explained that it was the caterpillar of a beautiful little black moth, with eight whitish-yellow spots on its wings, which had eaten up the foliage, my assertion was received with such a smile of incredulity, as convinced me that there is no use in trying to humbug such very sharp fellows as are the New York grape-growers.

"It is a little remarkable, however, that the destruction was confined to the eastern part of the city. I saw several luxuriant vines on the western side; and across the river at Hoboken, and at Hudson City, not a trace of *A. octomaculata* was discernible.

"The insect, then, is very local in its habits, and it is a day-flyer; and, from these facts, I infer that its ravages may be very materially checked. A little poisoned molasses, exposed in the neighborhood of the vine, would operate on the perfect insect [extremely doubtful]; while a good syringing with *soft soap* and water would bring down the caterpillars effectually."

THE BEAUTIFUL WOOD NYMPH—*Eudryas grata*, Fabr.

(Lepidoptera, Zygænidæ.)

Here is another moth (Fig. 56), surpassing in real beauty, though not in high contrast, the species just described. The front wings are milk-white, broadly bordered and marked, as in the figure, with rusty-brown, the band on the outer margin being shaded on the inner side with olive-green, and marked towards the edge with a slender wavy white line: under surface yellow, with two dusky spots near the middle. The hind wings are nankin-yellow, with a deep brown border, which does not extend to the outer angle, and which also contains a wavy white line: under surface yellow with a single black spot.

[Fig. 56.]

Surely these two moths are as unlike in general appearance as two moths well can be; and yet their caterpillars bear such a close resemblance to each other, and both feed upon the Grape-vine! The larva of the Beautiful Wood Nymph is, in fact, so very similar to that of the Eight-spotted Forester, that it is entirely unnecessary to figure it. It differs more especially from that species by invariably lacking the white patches along the sides, by the hairs arising from the black spots being less conspicuous, and by the hump on the eleventh segment being more prominent. The light parts of the body have really a slight bluish tint, and in specimens which I have found, I have only noticed six transverse black stripes to each segment. This larva, when at rest, depresses the head and raises the third and fourth segments, Sphinx-fashion. It is found on the vines in the central portion of the State as early as May and as late as September, and it devours all portions of the leaf, even to the midrid. It descends to the ground, and without making any cocoon, transforms to a chrysalis, which is dark colored, rough, with the tip of the abdomen obtusely conical, ending in four tubercles, the pair above, long and truncate, those below broad and short (Packard). Some of them give out the moth the same summer, but most of them pass the winter and do not issue as moths till the following spring.

THE PEARL WOOD NYMPH—*Eudryas unio*, Huebner.

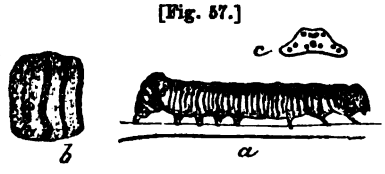
(Lepidoptera, Zygænidæ.)

This is another pretty little moth, so closely allied to, and so much resembling the preceding species, that it is not necessary to produce its picture. It is a smaller species, and differs from the Beautiful Wood Nymph in having the outer border of the front wings paler and of a tawny color, with the inner edge wavy instead of straight;

and in that of the hind wings being less distinct, more double, and extending to the outer angle.

The larva is said by Dr. Fitch to so much resemble that of the preceding species that "we as yet know not whether there are any marks whereby they can be distinguished from each other." (Report 3, § 124.) The moth is more common with us than its larger ally, and though I have never bred it from the larva, yet I have often met with a worm (Fig 57, *a*,) which there is every reason to believe, belongs to this species, and which is easily recognized from the preceding. It never grows to be quite so large as the other, and may readily be distinguished by its more decided bluish cast; by having but four light and four dark stripes to each segment (Fig. 57, *b*,); by having no orange band across the middle segments, and by the spots, with the exception of two on the back placed in the middle light band, being almost obsolete. The head, shield on the 1st segment, hump on the 11th, and a band on the 12th, are orange, spotted with black, the hump being marked as at Figure 57, *c*. Venter orange, becoming dusky towards head; feet and legs also orange, with blackish extremities, and with spots on their outside at base.

[Fig. 57.]



The worm works for the most part in the terminal buds of the vine, drawing the leaves together by a weak silken thread, and cankering them. It forms a simple earthen cocoon, or frequently bores into a piece of old wood, and changes to chrysalis, which averages but 0.36 inch in length; this chrysalis is reddish-brown, covered on the back with rows of very minute teeth, with the tip of the abdomen truncated, and terminating above in a thick blunt spine each side.

From the above accounts it is hoped that the reader will have no difficulty in distinguishing between these three blue caterpillars of the Grape-vine. But, says the practical grape-grower, "what does it concern me to know whether the little blue varmints that are defoliating my vines, belong to this species or to that? All I wish to know is how to get rid of them, and as they are all three so nearly alike, the remedy applied to one must be equally effectual with the others." Gently, dear reader; it *may* prove of considerable importance that you know which particular species infests your vines! If, for instance, a person living in the West should find the larvæ of the Beautiful Wood Nymph, then he need feel no alarm; while if a person living in the East should find that of the Pearl Wood Nymph, he may in like manner put his hands in his pockets and go his way with an easy mind; for neither of these species are likely to become troublesome in those respective sections of the country, since heretofore they have always been quite rare in those parts. Again, the larvæ of the two Wood Nymphs have a fondness for boring into old pieces of wood, to transform to the chrysalis state, and Mr. T. B. Ashton, of White Creek,

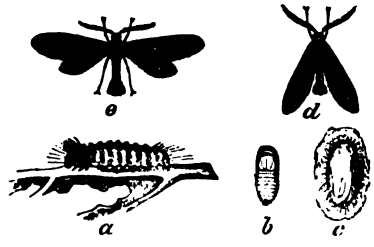
New York, found that they would even bore into corn cobs for this purpose in preference to entering the ground, wherever such cobs were accessible.* The Eight-spotted Forester, on the contrary, has no such habit, and while the only mode of combating it, is to pick the larvæ off and burn them, the Wood Nymphs may be more easily subdued by scattering a few corn cobs under the vines in the summer, to be raked up and burned in the winter.

THE AMERICAN PROCRIS—*Procris* [*Acoloithus*] *Americana*† Boisd.

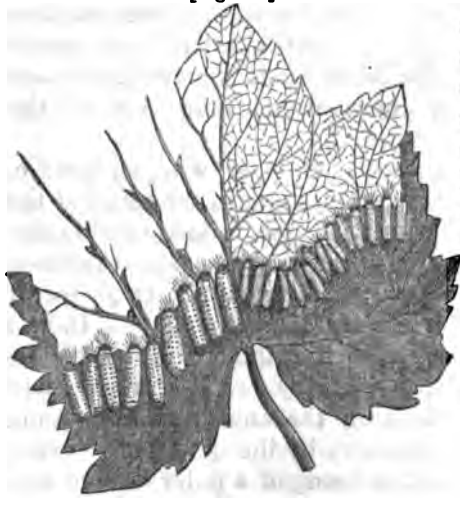
(Lepidoptera, Ctenuchidæ.)

During the months of July and August, the leaves of the Grapevine may often be found denuded of their softer parts, with nothing but the veins, and sometimes only a few of the larger ribs left skeleton-like, to tell of the mischief that has been done. Very frequently, only portions of the leaf will be thus denuded, and in that event, if we examine such a leaf closely, we shall find the authors of the mischief drawn up in line upon the yet leafy tissue with their heads all towards the margin, cutting away with their little jaws and retreating as they feed.

[Fig. 58.]



[Fig. 59.]



These little soldier-like files are formed by worms in black and yellow uniforms which produce a moth popularly known as the American Procris. The eggs from which they hatch, are laid in small clusters on the underside of the leaves, and while the worms are small, they leave untouched the most delicate veins of the leaf, which then presents a delicate net-work appearance as shown at the right of Figure 59; but when they become older and stronger they devour all but the larger ribs, as at the left of the figure.

*Fitch's Rep. III, p. 82.

†This is the *Aglaope Americana* of Clemens, *Procris Americana* of Boisduval and Harris, and *Ctenucha Americana* of Walker.

The full grown larva (Figure 58, *a*) measures rather more than half an inch, and tapers a little towards each end. It is of a sulphur-yellow color, with a transverse row of six velvety-black, prickly tufts on each of the principle segments, the lower tufts being less distinct than those on the back. The first segment is entirely black with a yellow edge, while the spots on segments 11 and 12 usually run into one another. Head small, brown, and retractile, being usually hidden in the first segment. Fine scattering hairs anteriorly, laterally and posteriorly. The young worm is of a very pale yellow, covered with numerous fine white hairs, with a slight grayish-brown tint on the head, and with the fifth and seventh segments paler than the rest, and having the black spots scarcely visible.

When full grown these worms disperse over the vines or forsake them entirely, and each spins for itself a small, tough, whitish, flattened cocoon (Fig. 58, *c*) within which, in about three days, it changes to a chrysalis (Fig. 58, *b*), 0.30 inch long, broad, flattened and of a light shiny yellowish-brown color. In about ten days afterwards the moths (Fig. 58, *e* and *d*) begin to issue. This little moth is the American representative of the European *Procris vitis;* it is wholly of a black color, except the collar, which is of a deep orange, and the body ends in a broad fan-like notched tuft, especially in the male. The wings are of a delicate texture, reminding one of crape, and when the insect is at rest they generally form a perfect cross with the body, the hind wings being completely hidden by the front ones, which are stretched out straight at right angles, as in the genus *Pterophorus*, to which belongs the Grape-vine Plume.* I have, however, on one or two occasions found the American Procris resting in the manner shown at Figure 58, *d*.

This is the only Grape-vine feeding caterpillar which has a gregarious habit, and as gregarious insects are always more easily subdued than those of a solitary nature, the American Procris need never become very destructive. Its natural food is undoubtedly the wild grape-vines of our forests, and the Virginia Creeper, and Mr. Jordon, of St. Louis, has noticed that while it very commonly attacks the foliage of the Concord, yet it never touches the Clinton and Taylor in his vineyard—a taste which is remarkable and not easily accounted for, since the foliage of the latter kinds is more tender and generally more subject to insect depredations than that of the former.

There are two broods of this insect each year with us, some of the moths from the second brood of worms issuing in the fall, but the greater part not leaving their cocoons till the following summer. During the month of June they may be seen in pairs about the vines, and I have also frequently observed around Hermann, a very closely allied but smaller and different moth (*Acoloithus falsarius*, Clem.) about the same season of the year. This last, though so closely resembling the other, may be distinguished by being scarcely more than half as large; by the body lacking the anal tuft and being comparatively much thicker and shorter; by the hind wings being comparatively larger, and by the collar being of a paler orange and divided on the top by a black point.

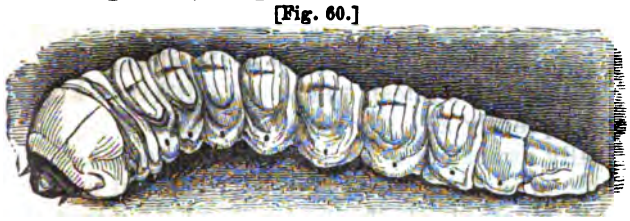
*First Rep., Pl. II, Fig. 15.

The American Procris, though the fact is not mentioned by other authors, is subject to the attack of at least one parasite, with us; for I have bred from it a very peculiar little four-winged black fly belonging to the great *Chalcis* family, and which Mr. Cresson of Philadelphia refers doubtingly to *Perilampus platygaster*, Say.

THE NEW GRAPE-ROOT BORER.

Under this head I published last year* an account of a gigantic Grape-root borer which had at that time not been bred, and of which, in consequence, the perfect insect was not with certainly known. In order that the reader may get well familiarized with its appearance, the figure is here reproduced (Fig. 60). For reasons then given I inferred that this borer belonged to the *Prionus* family of the Long-horned beetles, and that it would perhaps produce the Cylindrical Orthosoma (*Orthosoma cylindricum*, Fabr.), a large flattened bay-colored beetle which is common throughout the country, and especially so in the Mississippi Valley, and which I illustrated at the time. I expressed the hope to be able another year to settle this matter, and am glad to be able to do so.

[Fig. 60.]



Last July I bred from worms that had been sent to me the year before, as occurring in Grape root, a different, though very closely allied species to that which I had inferred they would produce, namely,

THE BROAD-NECKED PRIONUS—*Prionus laticollis*, Drury.

(Coleoptera, Prionidæ.)

[Fig. 61.]

This species is usually of a darker color than the Cylindrical Orthosoma, and differs materially from that species by its larger size and broader form. The female, which is represented at Figure 61, differs from the male in having shorter and narrower antennæ, though her body is usually larger.

In all probability this insect lives nearly three years in the larva state, for three distinct sizes may be found. Those I have bred, left the roots they were inhabiting when about to become pupæ, and formed for themselves smooth oval chambers in the earth wherein they eventually cast their larval skins, and

*First Rep., pp. 124–8.

[Fig. 62.]

assumed the pupa form represented at Figure 62, but in all probability they transform within the root, when in more natural conditions. This change takes place towards the end of June, and the perfect beetle appears in about three weeks afterwards.

Soon after breeding this beetle from Grape-feeding borers, I bred a female of the same species from a very large borer which I had found the same spring, in an apple root, it having entirely killed a young apple tree, by hollowing out nearly all the roots, and by finally severing the tap root near the butt of the tree.

Thus it results that the Broad-necked Prionus bores in the larva state indiscriminately in the roots of the Grape-vine and Apple, and perhaps in those of the closely allied Pear. According to Harris it also infests the roots of different kinds of poplars, and it is consequently a pretty general feeder.

Few persons are really aware of the amount of damage these gigantic borers are capable of causing. Last March I received a long letter from Mr. Robert S. Munford, of Munfordsville, Ky., minutely describing this borer, and the manner in which it destroyed three hundred dollars' worth of his apple trees; while Mr C. R. Edwards, of Bowling Green, Ky., writes that they have been quite injurious to his grape-vines of all varieties, though his Ionas suffered most from their attacks. Mr. Emory S. Foster, of Bushburg, sent me a specimen in May with the statement that it cut off a vine, after the fall of the leaf, and then went some six inches further down, and entered the main root, making for itself a comfortable residence where it spent the winter. Messrs. Bush and Spaulding inform me that they are continually losing vines from this borer, and that they consider it one of the worst enemies they have to contend against.

Little can be done to prevent the ravages of these underground borers after they are once in a vine, the death of which is usually the only manifestation of their presence. Still, every vine-grower should make it a rule to search for them whenever he finds vines suddenly dying from any unknown cause, and upon finding such a borer should at once put an end to its existence. The beetles, which may often be found during the summer and fall months, and which not unfrequently rush with heavy, noisy flight, into our lighted rooms, should also be ruthlessly sacrificed whenever met with. As I shall presently show, however, much may be done by judicious management to prevent their getting into the vines.

THE TILE-HORNED PRIONUS—*Prionus imbricornis*, Linn.

(Coleoptera Prionidæ.)

There is another species, the Tile-horned Prionus (*Prionus imbricornis*, Linn., Fig. 63 ♂)—so called from the joints of the male antennæ lapping over one another like the tiles or shingles of a roof—which very closely resembles the Broad-necked Prionus, and is with us much commoner. It may be distinguished at once from this last by the antennæ of the male being about 19-jointed, and those of the female about 16-jointed;* whereas both sexes of the Broad-necked Prionus have 12-jointed antennæ. In other respects, these two beetles are almost exactly alike, so that, if the antennæ happen to be broken, it is not very easy to tell one from another.

[Fig. 63.]

♂

Hitherto it has not been known upon what kind of tree this species fed, but I was fortunate enough last summer to ascertain that it also infests grape-roots. On the first of July last, Mr. Isidor Bush, of Bushburg, brought me quite a number of full-grown larvæ which he had taken from the roots of his grape vines. These were so very similar in appearance to those which produced the Broad-necked species, that I had not a suspicion they would produce anything else, and I was consequently greatly surprised when I bred from them a number of the Tile-horned species under consideration. By collecting together fibres and chips of the roots, they form a loose sort of cocoon, and transform, either inside or outside of the root, to pupæ, which resemble so closely that shown in Figure 62, that they can scarcely be distinguished from it.

We have, therefore, two distinct insects which bore into the roots of the Grape-vine, and which, though distinct, are so closely allied, that the females can only be distinguished by the number of joints in their antennæ. One of these is known to attack, besides the Grape, the Apple, the Lombardy poplar and the Balm of Gilead, and the other is very likely equally indifferent as to its choice of diet.

The accounts given in my former article, of the immense borers found in Osage Orange roots, and even in the roots of corn-stalks, undoubtedly refer to one or the other of these insects, and probably to the Tile-horned species, as that is the most common.

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* Having examined nearly 20 males of this species, I have found the antennal joints to vary in number from 18 to 20, the same specimen often having a different number of joints in the right and left antenna. In one ♀ the antennæ are both of them 16-jointed, in another ♀ they are both of them 17-jointed. The typical number of joints in the Coleopterous antenna is only 11; and the number being so variable in these many-jointed antennæ is in accordance with the general rule, that multiple parts are often variable.

Several persons who have recognized this immense borer from the figure and description which I published last year, have informed me that they have found it on prairie land, and Mr. Wm. C. Holmes, nurseryman, of Plattsburg, writes: "The Borer described on page 124 of your Report is destroying a good many of our apple grafts, set last spring. The root not being large enough for them to work inside, they eat out about one-third of the bark, and hollow out the rest of the root. Our nursery is on prairie, broke in the fall of 1867 and spring of 1868." Now the fact of these large root-feeding borers occurring in such numbers in recently turned-up prairie land where no large roots exist, would have been perfectly inexplicable had I not been cognizant of other facts which threw light on the subject.

There is a small dimorphous male form of the Tile-horned Prionus not more than half the normal size, and of a much paler yellowish color, which is quite common in the West, and which I have found even more common around St. Louis, than the true type. I know that this form is often found in prairie regions, and my entomological friend Chas. Sonne, of Chicago, Illinois, informs me that a relation of his, Mr. F. Jæger, of Siegel, Illinois, in digging a cellar, once found immense numbers of these large grubs near the surface of the ground. A whole lot of them were sent to Mr. Sonne, and he bred from them numerous specimens of this small form of the Tile-horned *Prionus*, every one of them males, and every one with nineteen joints to the antennæ. On another occasion, at the same place, Mr. Sonne, having placed a lamp on a grind-stone, found that these beetles swarmed around the light, and next day upon examining a number which he captured, they all proved to be, in like manner, the small yellow form, and all males. Now, Mr. Jæger's house is remote from any timber whatever, there being but a few scrub willows here and there near by; and, from these facts, and those mentioned by Mr. Holmes, we are forced to the belief that these grubs (at least those of the small ♂ dimorphous form) are able, not only to subsist on the roots of small shrubs and very young trees, but also upon those of herbaceous plants. Mr. H. A. Mungor, of Lone Cedar, Martin county, Minnesota, has had a similar experience; for he often ploughs up these grubs in prairie land, and has captured the beetles a full mile away from any trees or shrubs, except a few specimens of a suffruticose plant known as the Lead-plant (*Amorpha Canescens*), which very seldom grows a root there, of over one-half inch diameter. He has also actually bred the beetle from pupæ found in such prairie ground. Therefore, some of the accounts—such as their occurring full grown in the roots of annuals like corn and cabbage, and in those of grape-vines but one year planted—which were not easily explained before; become perfectly clear, now that we have a better understanding of the facts in the case.

Now then comes the point of practical importance. It may with reason be argued, that it matters little to the Grape-grower to which

particular species these borers belong, so they have the habit in common, of infesting the roots of his vines. But a more important question presents itself to the thinking mind. Is any danger to be apprehended from these borers, from growing grape-vines and fruit trees among decaying oak stumps? In my former article, from the testimony of practical vineyardists, I have hinted that there is, and have advised not to plant on land covered with such stumps, or even to use oak stakes, where those made of cedar can be had; and I am glad to be able to say that this advice is well founded.

As a general rule, the larvæ of the Long-horned Boring Beetles either inhabit green and living wood or else decaying and dead wood, the same species never attacking both kinds of wood indiscriminately; and as I knew that the larva of the Cylindrical Orthosoma fed on rotten pine wood, I thought it very probable that it also fed on rotten oak stumps, and had been confounded by practical men with those of the Broad-necked and Tile-horned species, which it so much resembles. This opinion was supported by the fact that it occurred abundantly in Union county, South Illinois, in 1861, where there are no pine trees growing, and where, at that period, the so called "poplar" or white-wood was universally used in buildings, in place of pine imported from the North; and I last summer ascertained that it really does breed in rotten oak stumps, as well as in decaying pine, for I found it in the former wood, both in the larva, pupa, and fresh beetle state. But what is still more important I also find that the Broad-necked Prionus, is an exception to the rule above mentioned, and that it breeds as freely in decaying oak stumps as in living roots. For this fact I am indebted to Mrs. Mary Treat of Vineland, N. J., who has sent me specimens of the beetle bred from larvæ that are found abundant in the oak stumps in that vicinity.

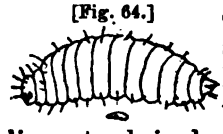
SUMMARY.—To sum up the whole matter in a few words, it is obvious that we have in Missouri three large boring grubs, which so closely resemble each other, that they cannot be distinguished by any marks which we are yet acquainted with—that the Broad-necked Prionus feeds indiscriminately on the living roots of Apple, Grape-vine, Poplar (and perhaps of several other trees), and on decaying oak stumps, and will travel through the ground from one place to another—that the Tile-horned Prionus not only attacks the Grape-vine, but can subsist on the roots of herbaceous plants, and in all probability will also feed on decaying oak, like the former species; and finally, that the Cylindrical Orthosoma feeds on decaying pine and oak, but has not yet been found in living roots. From these facts we may deduce the important corollary, that it will not do to leave oak stumps to rot on ground which is intended for a vineyard or orchard—which was the thing to be proved.

THE GRAPE SEED-MAGGOT—*Isosoma vitis*, Saunders.

(Hymenoptera, Chalcididæ.)

In my First Report (pp. 125–31), I gave an account of a minute maggot (Fig. 64) which had been found by Mr. Wm. Saunders, of London, C. W., to infest the seeds of growing grapes, and to occasion much damage around London and Paris, by causing the berries of the Clinton, Delaware, Rogers' No. 4, and some of Mr. Arnold's Seedlings, to shrivel up without maturing. There are so many noxious insects, common in Missouri, that occur also in the southern portions of Canada West, that it was deemed necessary to give the grape-growers of the State a diagnosis of its work, in case it should at any day make its appearance in our vineyards.

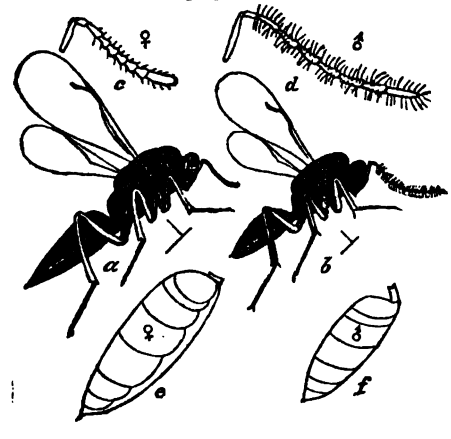
[Fig. 64.]



From the appearance of this maggot, I inferred, with every one else who gave an opinion, that it would most likely produce some small species of snout-beetle (*Curculio* family). Now mark how dangerous a thing it is, for even an entomologist to guess at the character of some insects, when in this masked form. We flatter ourselves that there are but very few insects among the half million different species that are estimated to exist in the whole extent of this terrestrial globe of ours, that we cannot place at a glance in its proper Order, even when in the larva state; but let us humbly acknowledge that there are some few larval forms among the more minute Four-winged Flies (order *Hymenoptera*) and Beetles (order *Coleoptera*) which it is almost, if not absolutely, impossible to distinguish the one from the other.

Last August I had the pleasure of spending a few hours with Mr. Saunders, at his place in London, and I was gratified to learn that he had bred the perfect insect from this seed-maggot. It proved to be a little Four-winged fly (*Chalcis* family), and upon my return home, I found a few specimens of the very same species of fly, in a bottle in which were placed some infested grapes received the year before from Mr. A. S. Fuller of New Jersey, and obtained by him from Canada.

[Fig. 65.]



This fly so closely resembles the notorious Joint-worm Fly (*Isosoma hordei*, Harris) that the accompanying highly magnified sketch (Fig. 65) of that insect—*a* representing the female, *b* the male, *c* the ♀ antenna, *d* the ♂ do., *e* the ♀ abdomen and *f* the ♂ do.—will afford a very correct idea of its appearance.

The Grape Seed-maggot Fly differs principally from the Joint-worm Fly in its somewhat smaller size, in the legs being marked

with black on the thighs and shanks, in the ♂ abdomen being comparatively shorter, and in its third ring conspicuously overhanging the fourth. The following account and description from Mr. Saunders himself, is taken from the November number of the *Canadian Entomologist:*

"In October I detached a larva from the inside of the seed, and placed it in a small glass cell between two plates of glass, in which state it remained until early in January, when it became a pupa, having first attached itself to the sides of the cell by a few short silky threads. It had now contracted in length, become nearly oval, and assumed a yellowish tint, with a few short loose silky threads adhering to different parts of its surface. On the 11th of February I examined some seeds and found the larva within, still alive and active, just as it appeared in the fall. On the 7th of July further specimens were opened and the inmates found soft and motionless; these appeared to be in the pupa state, but I did not examine them with sufficient care to enable me to be positive. During the remaining part of July, I looked many times into the bottles in which the grapes were enclosed but could not discover anything. On the 9th of August, feeling sure that the time for the appearance of the insect must be fully come, if not already past, I resolved on a thorough search for it. As soon as the contents of the bottles had been emptied on a piece of white paper, I observed a number of small four-winged flies among the dried-up grapes. They were all dead and stiff, some of them more brittle than others. From the observations made, I should judge that they made their escape from the middle to the end of July."

ISOSOMA VITIS, Saunders, ♀—*Head* large, flattened in front, black, thickly punctured, and covered with many short whitish hairs; mandibles pale brown at base, tipped with black; antennæ (scape and 8 joints), 9-jointed, black, thickly covered with whitish hairs inserted in deep sockets; the scape pale brown, slender, nearly as long as the three following joints together; the second short; third to eighth inclusive nearly equal in length; the terminal joint longer, tapering slightly towards the tip. *Thorax* black, punctured and covered with whitish hairs. *Legs*, front pair pale brown, trochanters nearly black; second and third pairs, trochanters black, femora and tibiæ nearly black along the middle, pale brown at tips; tarsi pale brown. *Abdomen*, long, black, straight, smooth, with a polished surface; placed on a short pedicel; a little contracted at base, thickest on third joint, tapering gradually to fifth, and then suddenly to extremity; the basal joint very short, second and third each somewhat longer, fourth as long as the three preceding, fifth less than half as long as fourth, sixth a little shorter, terminal joint rather longer.

♂ differs from ♀ in having the antennæ somewhat longer and more thickly covered with hairs. His abdomen is short, thick and blunt, placed on a moderately stout pedicel nearly its own length. The abdominal rings have about the same relative size as in the female, but the posterior edge of third overhangs the fourth, the latter appearing as if partially drawn within the projecting edge of the third ring.

Length ♀ 0.10, ♂, 0.06 inch.

"Having kept the grapes in bottles, only occasionally opened for ventilation, in a dry room, they had become quite hard, dry and shrivelled. In consequence of this, many of the flies were unable to make their way out, the seed having become too hard for their jaws to eat through. On opening some of these the flies were found dead with wings fully developed and surrounded by small fragments of the interior coating of the seed which they had evidently gnawed off while

endeavoring to escape. Those which had found their way out ha eaten a small nearly round irregular hole through seed and skin. I many similar cases where the larva feeds within a hard substanc it provides for the escape of the perfect insect by eating away th hard enclosure until it is reduced so thin as to appear almost trans parent, then a very little effort is sufficient to remove the obstructio to the outward passage of the imago. In this instance I have bee unable to detect any such preparation, and believe that the whol work of escape is accomplished by the perfect fly.

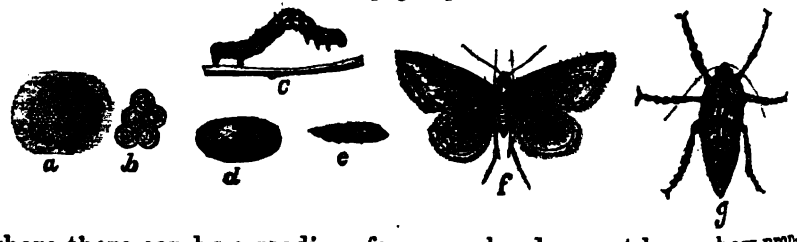
"Notwithstanding the abundance of this insect last year, I hav as yet been unable to detect their presence or any evidence of the work during the present season; probably the cold and wet characte of the summer has been unfavorable to their operations."

THE CANKER-WORM—*Anisopteryx vernata*, Peck.

[Lepidoptera Phalænidæ.]

This word CANKER-WORM has formed the heading of so many arti cles in our various Agricultural and Horticultural journals during the last ten or twelve years, and its natural history has been so fully given in the standard work of Dr. Harris, that one almost wonders

[Fig. 66.]



where there can be a reading farmer who does not know how prop erly to fight it. But then, new generations are ever replacing those which pass away, so that the same stories will doubtless have to be repeated to the end of time. Facts in Nature will always bear re peating, and as it may be laid down as a maxim that no injurious in sect can be successfully combated without a thorough knowledge of its habits and transformations, I will first recount those of the Canker worm, and afterwards state the proper remedy.

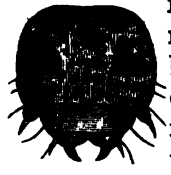
The eggs of this insect are very minute, measuring about 0.03 inch in length and 0.02 in diameter. In form they are not unlike a miniature hen's egg, minutely roughened and with longitudinal irregu lar depressions. They reflect prismatic colors, and are deposited close together in rows, forming batches such as that shown in the above Figure 66, *a* representing them of the natural size, and *b* rep

resenting them magnified. They are glued together by a grayish varnish which the mother moth secretes, and they are attached to the trunk, or to some one or other of the twigs of the tree, and may often be found on the inside of loose scales of bark, each batch consisting of upwards of a hundred eggs.

As the leaves begin to form, these eggs hatch into minute, thread-like span-worms, which in from three to four weeks afterwards acquire their full size, when they appear as at Figure 66 *c*. The Canker-worm is distinguished from most other caterpillars that attack the Apple, by having but four prolegs at the end of the body. The normal number of such prolegs in caterpillars, is ten; and it is the lack of the foremost six which obliges our insect to span or loop, from which habit the characteristic name GEOMETRIDÆ has been given to the group to which it belongs.

When full-grown this worm measures scarcely an inch in length, and is commonly ash-gray on the back, darker at the side and yellowish beneath. It varies greatly in the intensity of its markings however, ash-gray, green, and yellow ones occurring in the same brood, and the most constant character by which it may be distinguished from other span-worms of the same size, is the pattern of the head, which, no matter what the general hue of the body may be, is usually shaded and marked as in the annexed Figure 67. The markings of the worm vary indeed so much, that, without this criterion I could hardly venture to determine a Canker-worm larva myself.

[Fig. 67.]



I subjoin a very full description of this worm from numerous average specimens, as it is of considerable importance, that an orchardist may be able to ascertain definitely whether he is troubled with the true Canker-worm or not. For if he mistakes some other span-worm which produces winged females as well as winged males, for the genuine Canker-worm which is apterous in the female moth state, it becomes very obvious that all his efforts to try and prevent the ravages of the spurious Canker-worm by the most approved and well-tried methods, will not only fail most absolutely, but he will lose all faith in such remedies, and may perchance, if he is given to the use of the quill, vent his wrath and disappointment by sending to some one of the horticultural journals of the land, a pithy article "based upon FACTS [?] and EXPERIENCE" showing up the utter worthlessness of the Canker-worm remedies!

It is from such lack of true knowledge that the City Fathers of Baltimore, Maryland, went to the useless expense of furnishing oil troughs for all their large elm trees which were being defoliated, under the delusive idea that the insect committing the ravage was the Canker-worm; whereas it turned out to be the larva of a little imported Beetle (*Galeruca calmariensis*, Fabr.), the female of which has ample wings, and can fly as readily as a bird from tree to tree; and it is

from such oversights, that paragraphs like the following take their rise. This one may be found in the *Boston Journal* for may 23d 1866:

ORIGIN OF CANKER-WORMS.—A Medford correspondent says that last fall he applied to his trees protectors which were pronounced the best in the neighborhood, and notwithstanding not a single grub passed over them, the trees, like others in the vicinity, are this season covered with worms which are now pursuing their devastating work. In his opinion the Canker-worms do not originate from the grub, and he challenges proof that they do. The subject is one worthy of investigation!

Whe-e-e-e-ou! It needs no comments in this Report.

When first hatched the young Canker-worms are of a dark olive-green or brown hue, with a shiny black head and thoracic legs, with a whitish lateral and dorsal band, the latter having a darker central line along it. After the first moult, the head becomes lighter and mottled, and the light bands less conspicuous. After the second moult the bands are almost obliterated and the body becomes more uniformly mottled and speckled with livid-brown; the head becomes still lighter and the prolegs being now large, spread out at almost a level with the venter. After the third (and I believe last) moult the appearance changes but little. The full grown larva averages 0.90 inch in length with an average diameter of 0.10 inch, being broadest on joint 11. It varies from light fleshy-gray to almost black. Head mottled as in Figure 67. Ends of body somewhat darker than middle. Joint 1 with a yellowish dorsal shield, the hinder margin in form of a rounded W. Viewed under a lens the body has a series of eight fine light yellowish, irregular, somewhat broken lines, running the whole length of the body, each one relieved by a darker shade each side of it. The two along middle of dorsum are close together, with the space between them usually dark, and occupied at anterior edge and middle of joints 5, 6, 7 and 11 by black marks somewhat in form of x, these marks being represented by simple black dots on the other joints. Space between these dorsal lines and the next lowest, lighter, and containing four black piliferous spots to each joint, the posterior ones rather further apart than the anterior ones which on joint 11 form two larger elevated shiny black spots. Space between lines 2 and 3 darker than any other part of the body. That between lines 3 and 4 lighter than any other part of body and containing the stigmata which are perfectly round and black with a light centre, with a small piliferous spot anteriorly above and below them, and another behind them, this last becoming large on joints 5, 6, 7 and 8. Venter dark and livid at borders, with a pale greenish band along the middle, which has a pinkish patch in it on joints 5, 6, 7 and 8. Legs greenish at base, color of body at extremity. The markings are most distinct on the light specimens.

The Canker-worm is by no means confined, in its destructive work, to the Apple, for it likewise attacks the Plum, the Cherry, the Elm, and a variety of other trees. Mr. R. J. Mendenhall, of Minneapolis, Minn., even informs me, in a recent letter, that "the Currant worm" spoken of in a late number of the *Farmer's Union* as infesting the currant bushes in the gardens around that city, were really Canker-worms, but he is most assuredly mistaken. The Canker-worm is seldom ever noticed on our trees till the riddled and seared appearance of the foliage tell of its presence; for, like most other span-worms, it has the habit of resting in a stiff straight posture, either at an angle of about 45° from, or flat and parallel with the twig which it occupies—thus eluding detection.

After it has attained its full size it either crawls down the tree or lets itself down by means of a silken thread, and burrows into the ground. Here, at a depth of two or three inches, it forms a rude cocoon of particles of earth intermixed with silk (Fig. 66, *d*). Within two days after completing the cocoon the worm becomes a chrysalis

of a light brown color. The sexes are now distinguishable, the male chrysalis (Fig. 66, *e*) being slender, pointed in front, and showing the wing-sheaths; while that of the female is larger and destitute of wing-sheaths.

In the latitude of St. Louis, the worms have generally descended from the trees and entered the ground by the middle of May, though some remain till about the first of June. As I have amply proved during the past two summers, there is but one brood each year in this State, just as there is but one brood in Maine, and whether the worms enter the ground the first or the last of May, they remain there as chrysalids all through the summer and fall months, and the great majority of them till the following spring. A frost seems to be necessary to their proper development. Some come out during the first mild weather that succeeds the first frosts in November; others issue all through the winter whenever the ground is thawed, and the great bulk issue as soon as the frost is entirely out of the ground in spring. Many which I bred this winter issued during the warm weather of January.

The moths (Fig. 66 *f* ♂, *g* ♀) show great disparity of sex, the male being fully winged while the female is entirely destitute of these appendages. The front wings of the male are pale ash-gray, crossed by three equidistant jagged, more or less defined, black lines, all curved inwardly, and most distinct on the front or costal border; and by a somewhat broader whitish line, which runs from the posterior angle to the apex; the inner and terminal borders also being marked with black. The hind wings are silvery-gray, and the under surfaces are of the same uniform silvery-gray color, each wing with a dusky discal spot, the front wings each with an additional spot on the costa. Such is the appearance of the more common perfect specimens found in the West, but the wings are very thin and silky, and the scales easily rub off, so that it is almost impossible to capture a perfect specimen at large. They vary considerably also—so much so that Dr. Harris ranks a smaller form as a distinct species (*A. pometaria*) which I have however bred promiscuously with the more typical specimens. The most common variation from the brief description above given, is found in such specimens which have the dark lines obsolete, and an additional white line inside the one described. The female is ash-gray, the thorax with a black spot, the body more or less marked with black along the back, and the legs alternately marked with black and white.

In Missouri the Canker-worm is not so injurious over broad tracts of country, as it is in some of the more eastern States. Yet it is sufficiently distributed in different parts, to require vigilance to keep it down. "R. P.," of Mexico, Mo., found it very injurious in the spring of 1868, and sent me many specimens, and they were the genuine article. Around Pevely, I have likewise found it common on the

farms of Dr. Varnum and Mr. Foster. Mr. Wm. M. Beal of Edina tells me that it is considered one of the very worst enemies in Knox county, and as I am informed by Mr. J. D. Dopf, editor of the *Journal*, Rockport, Atchison Co., it was exceedingly troublesome to the elms there in 1866. Where they have once become established, and are neglected, their ravages soon become very great; and they were so bad in certain parts of Michigan a few years ago, and especially in the Grand Traverse region in 1865, that, unless my memory fails me, a certain Eastern editor, in response to an appeal for a remedy from Mr. Sanford Howard, the Secretary of the Michigan State Board of Agriculture very foolishly urged the Wolverines to cut down their trees. May I hope that these Entomological Reports will be the means of protecting Missouri from the fearful ravages of this worm which has so often discouraged the orchardists in Massachusetts, Rhode Island, Connecticut, and some of the Middle States.

It is the apterous condition of the female moth which gives us such complete control of this enemy, and which indicates

THE PROPER REMEDY.

The sole object of the female, after she leaves the earth, seems to be to provide for the continuance of her kind, and she instinctively places the precious burden, which is to give birth to the young which she herself is destined never to behold, upon the tree whose leaves are to nourish these young. All her life-energy is centered in the accomplishment of this one object, and she immediately makes for the tree upon issuing from the ground. Consequently, anything that will prevent her ascending the trunk will, in a great measure (but as we shall presently see, not entirely) preserve the tree from the ravages of the worm.

Numerous indeed have been the devices—patented or unpatented—which have at different times and in different parts of the country been used to accomplish this desired end; and every year our Agricultural journals report individual experiments with some one or other of these devices—some favorable and others adverse. Tar, applied either directly around the body of the tree, or on strips of old canvas, on sheep-skin, or on stiff paper; refuse sorghum molasses, printers' ink, or slow-drying varnishes, or melted India rubber, which always retains its soft viscid state, applied in a similar manner; tin, lead, and rubber troughs to contain oil; belts of cotton-wool, etc., etc., have all been used, and with both good and bad results, very much according as they have been used intelligently or otherwise. Now, all these appliances, of whatsoever character, are divisible into two classes: first, those which prevent the ascension of the moth by entangling her feet, and trapping her fast, or by drowning her; and, second, those which accomplish the same end by preventing her from getting a foothold, and thus causing her repeatedly to fall to the ground until she becomes exhausted and dies.

The first class of remedies are thoroughly effectual when applied understandingly and persistently. And by this I mean, that the orchardist must know that many of the moths issue in the fall of the year, and that the applications must, in consequence, be made at least as early as the latter part of October, and that they must be kept sticky, through all but freezing weather, till the leaves have well put out, in the following spring. Furthermore he must know that many of the moths—frustrated in their efforts to climb the tree—will deposit their eggs near the ground or anywhere below the application, and that the young worms hatching from them are able to pass behind the slighest crevice or over the finest straw. Thus, if troughs are used, they must be fitted over a bandage of cotton-wool, so that when the trough is drawn tightly around the tree, it will do no injury, and will at the same time cause the cotton to fill up all inequalities of the bark; the joint must likewise be kept smeared either with tar or molasses, and then the worms will not be able to pass. In the neglect to thus fasten them, lies the secret of failure which many report who use such troughs. The second class of contrivances are of no avail whatever, for although the moth is unable to travel over a very smooth surface, I know from experience that the young worms can march over the smoothest glass by aid of the glutinous silken thread which they are able to spin from the very moment they are born. For these reasons, even the "Merritt's Patent Tree-Protector," which was so well advertised by Mr. Howard in his otherwise excellent article on the Canker-worm, in the Michigan Agricultural Report for 1865, must be classed with the worthless patents. This "Protector" consists of a ring of glass grooved below and hung from the tree by a tent of canvas, to which it is fastened by an iron clamp.

I might enumerate a number of such ingenious contrivances both of glass, wood, tin, and isinglass, for heading off the female moth *only*, and some few which are sufficiently thorough to head off the young larvæ also; but they are all so expensive, that I am perfectly convinced they will never be adopted in our large orchards; nor are they necessary, for some of the remedies already mentioned are altogether more simple and more effectual.

It cannot be denied that it requires a great deal of time, labor and expense to continually renew the applications of tar on every tree in a large orchard during so many months of the year; while its application directly to the bark is more or less injurious to the trees. For these reasons, refuse sorghum molasses will be found much better for the purpose, as it does not harden so rapidly, and is said not to be injurious to the tree. In neighborhoods where sorghum is grown, it is also much cheaper. That it will pay to do this work in orchards where the Canker-worm is known to be numerous, there cannot be the least doubt. The old adage, "What is worth doing at all is worth doing well," was never truer than in fighting this insect.

Apply the remedy thoroughly during two successive years, and you have utterly routed the enemy, and this is more especially the case where an orchard is not in too close proximity to the timber, or to slovenly neighbors. Fail to apply the remedy, and the enemy will, in all probability, rout you. The reason is simple. The female being wingless, the insect is very local in its attacks, sometimes swarming in one orchard and being unknown in another which is but a mile away. Thus, after it is once exterminated, a sudden invasion is not to be expected, as in the case of the Tent Caterpillar, and of many other orchard pests; but when it has once obtained a footing in an orchard, it multiplies the more rapidly, for the very reason that it does not spread fast.

If oil troughs are used, it will be found much safer, and surer to sink them in the ground close around the butt of the tree, instead of winding them around the trunk higher up. There will then be no chance for the young worms to get up between the trough and the tree. But it follows, that this plan can only be adopted in an orchard which is kept perfectly clean.

As for muriate of lime, which has been so earnestly recommended as a preventive, by interested parties, here is what Mr. Sanford Howard says of it in the *Western Rural* of August 18th, 1866, and Mr. Joseph Breck, editor of the old American *Journal of Horticulture*; G. C. Brackett, correspondent of the *Maine Farmer*, and several other persons with whom I am acquainted, all testify, after having thoroughly tried it, to its utter worthlessness for this purpose:

The editor of the *Farmer* says, there are statements to the effect, that a substance called Gould's Muriate of Lime, applied to the soil in autumn, had entirely prevented the subsequent appearance of Canker-worms on trees standing on the ground, although the trees had previously been much damaged by the insect. It is also stated that on other trees, not ten rods distant, where none of the so-called muriate of lime was applied, the worms were very destructive.

I cannot think that this amounts to any proof that the substance applied destroyed the worms, or had any effect on them. The non-appearance of the insect in the case alluded to, was probably due to other causes. If this substance will kill or injure the insect in any of its stages, it would be easy to prove it by a direct application to soil containing insects, in a box. Several years ago, I took pains to make a particular experiment with this so-called muriate of lime, the result of which was that the Canker-worm underwent its transformations naturally, and to all appearance healthfully, in a soil composed of nearly fifty per cent. of the articles of which it was said a small proportion only was necessary to totally destroy them? If the substance is the same in composition now that it was then, it is reasonable to suppose that the result of its application would be the same.

As to the "Plug Ugly Theory," which consists of filling an auger bore with sulphur and plugging it tight, and which originated, some years since, in the inventive brain of some *Prairie Farmer* correspondent; it is altogether too absurd to need consideration, for even if the mode of application were not so downright ridiculous, it is well

known to entomologists that many caterpillars will thrive exceedingly on leaves that have been thickly sprinkled with sulphur.

Vigilance is the price of reward, and as it is always easier to prevent than to cure, it were well for the owners of young orchards, in neighborhoods where the Canker-worm is known to exist, to keep a sharp look-out for it; so that upon its first appearance the evil may be nipped in the bud. In the same manner that it is exterminated in the individual orchard, in like manner, it may, by concert of action, be exterminated from any given locality. When once the worms are on a tree, a good jarring will suspend them all in mid-air, when the best way to kill them is by swinging a stick above them, which breaks the web, and causes them to fall to the ground; when they may be prevented from ascending the tree, by the methods already described, or by strewing straw on the ground and setting fire to it.

One word in commendation of late fall plowing and the use of hogs. A good deal has been said both for and against fall plowing, and the following discussion which took place at the November (1868) meeting of the Alton (Ills.) Horticultural Society, will afford a sample of the different opinions held by individuals:

Dr. Long took the ground that fall plowing was one of the best and surest means of eradicating those insects which stay in the ground over winter. He said, some five or six years ago my orchard was badly infested with the Canker-worm; by late cultivation, I almost, if not entirely, got rid of them.

Dr. Hull—I do not believe that fall plowing will destroy the larvæ of insects to any extent. I have dug up frozen lumps containing larvæ that were not affected by freezing. I think the Canker-worm will not spread here as in New England.

J. Huggins—I have been led to believe—contrary to Dr. Hull's statement—that they will spread, and feel that there is great danger of their spreading. I believe fall plowing a great aid in the extermination of them. Cites a case where they have been almost entirely destroyed by late plowing, in an orchard that was nearly ruined by them.

Dr. Hull—If it be true that they will spread, why is it that none of Dr. Long's neighbors have them? He says he was badly overrun with them, and the fact that his neighbors were not, I think confirmation of my statement that they will not spread.

Dr. Long—My brother's orchard, adjoining mine, had double as many as my own. He fall plowed, and has very few left. He also cites the case of an old orchard, in this section, that was almost destroyed by them, but fall plowing has almost, if not entirely, destroyed them.

The following item from the New York Weekly *Tribune* of February 26th, 1869, also bears on this point:

CANKER-WORMS DESTROYED BY PLOWING.—Mr. McNeil Witherton, in answer to W. V. Monroe's request: I will state that I think that the Canker-worm can be destroyed by plowing the ground where they are, late in the fall. The 28th of Nov., 1867, I was at my son David's in Wisconsin. He told me that the Canker-worms were in his orchard, and had injured his apple trees very much the past season; that a man who owns a nursery and keeps apple trees for sale, went into the orchard and examined the trees and worms, and said it was the Can-

ker-worm that was injuring his orchard. I told him that about fifty years ago they had been in my father's orchard some six years, and killed a large number of the trees; that we plowed it late in the fall, and have never seen the Canker-worm there since. I advised him to plow his orchard immediately. The next day he plowed it as far as the worms had been in it. I received a letter from him a few weeks ago, stating that the Canker-worms were not in his orchard this year, and those trees that were injured and not killed last year, revived some this year.

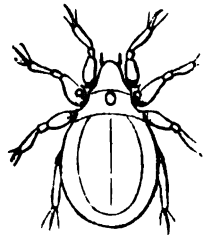
Now there is no doubt but late plowing will produce somewhat different effects, according to the character of the soil, and the depth of the plowing; but that it is more generally beneficial than otherwise I am perfectly convinced, and as for the assertion of Mr. Wm. P. Lippincott, of Vernon, Iowa, made some time ago, in the *Iowa Homestead*, namely, that it left the ground full of harbors for the next year's breeding, it suffices to say that the insect does not breed in the ground, and, holes or no holes, the worms will penetrate the soil whenever the time arrives to change to chrysalis. After the summer months the insect invariably lies in the chrysalis state snugly entombed in a little earthen cell very thinly lined with silk, from two to six inches below the surface. This cell, though frail, is a sufficient protection, so long as it is whole, from any excess of moisture, and at the same time prevents too much evaporation in case of summer drouth or dry winter freezing. Now I have proved by experiment that whenever this cell is disturbed or broken in cold weather, the chrysalis has not the power to penetrate the ground again, and in the great majority of instances, either rots, dries out, becomes mouldy, or, if on the surface, is devoured by birds. Even summer plowing, if performed after the first of July would work beneficially; and it is for this reason, that clean, well cultivated orchards are more free from the attacks of this insect, than slovenly and neglected ones. The only advantage of late fall plowing, lies in the facts, that the chrysalis is at that time too benumbed to work itself into the ground and form another cell, and that birds are then harder pushed for food, and more watchful for any such dainty morceau.

As to the efficiency of hogs, in rooting up and devouring the chrysalids, during the summer months, abundant favorable testimony might be cited; but the facts are too obvious to need argument.

ENEMIES OF THE CANKER-WORM.

Like most of our noxious insects, the Canker-worm is subject to the attacks of cannibal and parasitic insects. It is also devoured by very many different birds, some of which almost entirely live on it; and Dr. Packard, of Salem, Mass., has observed an elongated mite (*Nothrus ovivorus*, Fig. 68, enlarged) devouring its eggs. The most common parasite which I have yet discovered with us, is an undescribed small four-winged fly belonging to the genus *Microgaster*, of the same size, but differing from the Military Micro-

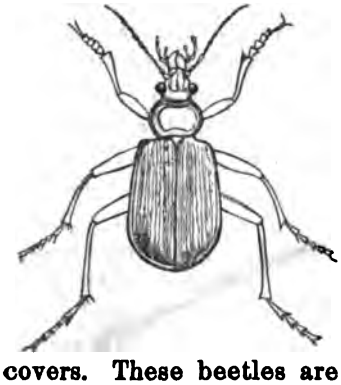
[Fig. 68.]



gaster (Fig. 23) which preys upon the Army-worm. It differs also from most other insects of the same genus, by each individual larva as it eats through the skin of the Canker-worm, spinning its pale greenish-white cocoon alone, and not in company. About ten per cent. of the worms which I have endeavored to breed, have been destroyed by this parasite. Harris mentions the larva of another four-winged fly, and that of a two-winged fly belonging to the genus *Tachina*, which also infest the worm, destroying about one-third of them in Massachusetts. There is also a very minute and undescribed species of *Platygaster* which pierces the egg of the Canker-worm, and drops one of her own into it, from which in due time the perfect fly develops.

Among the Cannibal insects, which prey upon it, may be mentioned the Ground-beetles, two of which I have found preying upon this worm, namely, the Rummaging Ground-beetle (*Calosoma scrutator*, Fabr. Fig. 69), a large and beautiful insect, with the wing-covers golden-green, and the rest of the body marked with violet-blue, gold, green, and copper; and the Fiery Ground-beetle (*Calosoma calidum*, Fabr. Fig. 70.), a black species of almost equal size, with copper colored spots on the wing-covers. These beetles are very active, and run over the ground in search of soft-bodied worms, and will even mount upon the trunks of trees for the same purpose.

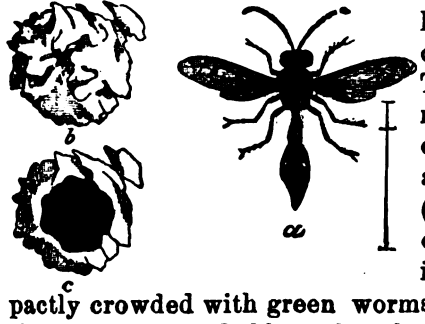
[Fig. 69.]



[Fig. 70.]

The Fraternal Potter-wasp (*Eumenes fraterna*, Say), is stated by Harris, to store her cells with Canker-worms, often gathering eighteen or twenty of them for a single cell. This wasp (Fig. 71, *a*), is quite common in St. Louis county, and uses other species besides Canker-worms as food for its young. Its clay nest (Fig. 71 *b*, entire; *c*, the same cut open shortly after it was built, showing the manner in which it is compactly crowded with green worms), may often be found attached to the stems of the Goldenrod and of other plants in the open air, or cemented under the loose bark of some tree. It has even been found attached to the leaves of a deciduous plant, where it must necessarily fall to the ground in winter and lie there till the perfect insect issues in the following summer.

[Fig. 71.]



CABBAGE WORMS.

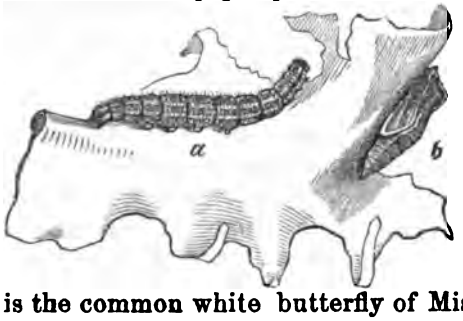
Of the various insects that affect this important esculent, the three following are among the most injurious in this State:

THE SOUTHERN CABBAGE BUTTERFLY—*Pieris protodice*, Boisd.

(Lepidoptera, Pieridæ.)

Mr. S. H. Scudder, of the Boston Society of Natural History, from an examination of a large number of specimens of this butterfly, found that it enjoys a wide geographical range, "extending from Texas on the southwest Missouri on the west, and the mouth of the Red River of the North on the northwest, as far as Connecticut, and the Southern Alantic States on the east."* But while the species is scarce in the more northern States, it is the common white butterfly of Missouri, abounding in many parts of the State, and sometimes flitting so thickly around the truck gardens near large cities, as to remind one at a distance, of the falling of snow. It often proves exceedingly injurious, and I learn from a Mississippi exchange, that "there were last year thousands of dollars' worth of cabbages devastated and ruined by worms in the neighborhood of Corinth." The paragraph goes on to state, "that cabbages could not, in consequence, be had there even at ten cents per head." The "worm" referred to, was doubtless the species under consideration.

[Fig. 72.]



[Fig. 73.]

I have often passed through cabbage beds near St. Louis, and been unable to find a perfect head, though few of the gardeners had any suspicion that the gay butterflies which flitted so lazily from one plant to another, were the real parents of the mischievous worms which so riddled the leaves.

The larva (Fig. 72, *a*) may be summarily described as a soft worm, of a greenish-blue color, with four longitudinal yellow stripes, and covered with black dots. When newly hatched it is of a uniform orange color with a black head, but it becomes dull brown before the first moult, though the longitudinal stripes and black spots are only visible after said moult has taken place.

I subjoin a more complete description of it:

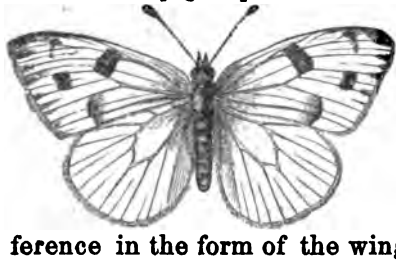
Average length when full grown 1.15 inches. Middle segments largest. Most common ground-color green verging onto blue; sometimes clear pale blue and at others deep indigo or

* See Proc. Bost. Soc. Nat. Hist., VIII, 1861, p. 180.

purplish-blue. Each segment with six transverse wrinkles, of which the first and fourth are somewhat wider than the others. Four longitudinal yellow lines, each equidistant from the other, and each interrupted by a pale blue spot on the aforementioned first and fourth transverse wrinkles. Traces of two additional longitudinal lines below, one on each side immediately above prolegs. On each transverse wrinkle is a row of various sized, round, polished black, slightly raised, piliferous spots; those on wrinkles one and four being largest and most regularly situated. Hairs arising from these spots, stiff and black. Venter rather lighter than ground-color above, and minutely speckled more or less with dull black. Head same color as body; covered with black piliferous spots, and usually with a yellow or orange patch each side—quite variable. The black piliferous spots frequently have a pale blue annulation around the base, especially in the darker specimens.

The chrysalis (Fig. 72, *b*), averages 0.65 inch in length, and is as variable in depth of ground-color, as the larva. The general color is light bluish-gray, more or less intensely speckled with black, with the ridges and prominences edged with buff or with flesh-color, and having larger black dots.

[Fig. 74.]

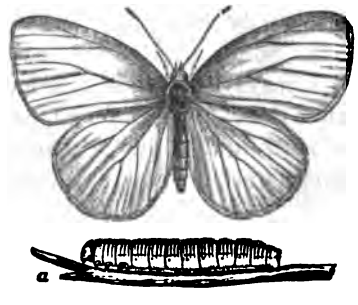


The female butterfly (Fig. 73) differs remarkably from the male which I represent at Figure 74. It will be seen, upon comparing these figures that the ♀ is altogether darker than the ♂. This sexual difference in appearance is purely colorational, however, and there should not be the difference in the form of the wings which the two figures would indicate, for the hind wings in the ♂ cut, are altogether too short and rounded.

This insect may be found in all its different stages through the months of July, August and September. It hybernates in the chrysalis state. I do not know that it feeds on anything but Cabbage, but I once found a ♂ chrysalis fastened to a stalk of the common nettle (*Solanum carolinense*), which was growing in a cemetery with no cabbages within at least a quarter of a mile: and Mr. J. R. Muhleman is reported as having stated at a late meeting of the Alton (Illinois) Horticultural Society, that it is injurious to turnips and other plants of the cabbage family. There are two broods of this insect each year.

As already stated, in the more northern and eastern States our Southern Cabbage Butterfly occurs in comparatively small numbers, but it is replaced by the Potherb Butterfly (*Pieris oleracea*, Boisd.), an indigenous species which does not occur with us. This last (Fig. 75, butterfly with the larva beneath) is in reality a northern species, for it rarely reaches as far south as Pennsylvania, but extends east to Nova Scotia, west to Lake Superior, and north as far as the Great Slave Lake in the Hudson's Bay Company's territory. It is readily distinguished

[Fig. 75



from our species by being perfectly plain, with no black spots on the wings. The body is black, and the front wings have a slight shade of this color at their base, front edge, and tips. Its larva is pale green and feeds on various other cruciferous plants besides cabbages; its chryalis (Fig. 76) is also pale green or whitish, regularly and finely dotted with black.

[Fig. 76.]

This butterfly has existed from time immemorial on the American continent, within the geographical limits already given, and yet has never made its way into Missouri or any of the southwestern States. Nor is it likely to ever do so; and why? Because some insects are constitutionally incapacitated to live beyond certain geographical limits. The range of an insect is governed by various influences which I have not time to enumerate at present; but the principal influence is undoubtedly climate—temperature—heat. The "isothermal" lines, or the lines of equal heat, as all physical geographers are well aware, do not run parallel with the lines of latitude, as one might at first thought suppose; but if our isothermal maps are to be relied on, vary most astonishingly to points north and south of a given line. The same variation from a given line of latitude is noticeable in the distribution of insects, or—to coin a word—we have "isentomic," or iso-insect lines, which are as variable as the lines of equal heat, by which they are doubtless to a great extent governed. In Central Missouri we live on nearly the same latitude as that of Southern Pennsylvania, and in North Missouri, as that of Southern New York; yet we do not live on the same insect line, but nearly on that of Virginia and North Carolina, and even in the extreme northern part of the State, a number of insects are found, which on the Atlantic seaboard are never known to occur north of Virginia, and the same rule holds good with the birds and fishes of the United States. The same thing is true of our Central and Southern counties. In other words many of our insects are *southern*, not *northern* species, and as familiar examples, I might mention the Tarantula of Texas (*Mygale Hentzii*, Girard), and its large Digger-wasp enemy (*Pepsis formosa*, Say), which have been frequently found in St. Louis county during the past two years, though they were for a long time supposed to be confined to Texas.

Now, since the indigenous Potherb Butterfly has never, in the course of past ages, extended to any point South of Pennsylvania, although its cruciferous food-plants have always flourished South of that line, we are justified in concluding that it never will do so, and that though a brood of the worms were introduced directly on to some cabbage patch in the extreme Northern part of this State, they would soon die out there.

Consequently we have nothing to fear from this butterfly which has always troubled our northeastern friends. But the case is very different with another white cabbage butterfly which is now committing sad havoc to the cabbages in some parts of Canada, and some

of the Eastern States. The species I refer to is the Rape Butterfly (*Pieris rapæ*, Schrank), a recent importation from Europe, and while I have no fear of any evil results arising from the introduction of the Potherb Butterfly, I should hate to try the experiment of introducing a brood of worms of the Rape Butterfly into any portion of the State; because, for the reasons detailed in the paper read before the State Horticultural Society, and which is published at the beginning of this Report, I have not a doubt but they would flourish exceedingly, and become far more injurious than either of the indigenous species. Indeed, the history of this insect, since its introduction into this country, affords sufficient proof that such would be the result, for M. Provancher in a recent number of his journal, *Le Naturalista Canadien*, says that it alone, has caused more damage around Quebec, since its arrival there, than all other noxious butterflies put together, in the same space of time; and he estimates that it annually destroys $240,000 worth of cabbages around that town. In short, as this insect is rapidly spreading westward, there is every reason to fear that it may some day get a foothold in our midst, unless the proper measures are taken to prevent such an undesirable occurrence. It will be well therefore to familiarize the reader with its appearance, for "to be forewarned is to be forearmed!"

Little did I dream, when, many years ago, I watched this butterfly fluttering slowly along some green lane or over some cabbage patch in England, where it is THE butterfly; or when I found its chrysalis so abundantly in the winter time on old palings or even on the kitchen wall indoors—that I should some day be fearing its presence here. But just as little did our forefathers dream of the immense though gradual changes which have come over this broad land during the last two or three centuries! Coming events are said to cast their shadows before them, but verily we know not what the morrow will bring forth.

This Rape Butterfly is the bane of every cabbage grower, and its larva is the dread of every cook in many parts of Europe. Unlike the two indigenous N. A. species already alluded to, this worm is not content with riddling the outside leaves, but prefers to secrete itself in the heart, so that every cabbage has to be torn apart and examined before being cooked, and it is also necessary to keep a continual lookout, even after it is dished up, lest one gets such an admixture of animal and vegetable food as is not deemed palatable by the most of men. It is on account of this habit of boring into the heart of cabbages, that the French call it the "Ver du Cœur" or Heart-worm.

It was introduced about 1856 or 1857, having been first taken in Quebec in 1859. In 1864 Mr. G. J. Bowles, who published an account of it in the *Canadian Naturalist and Geologist*, for August, 1864, p. 258, estimated that it had not then extended more than forty miles from Quebec as a centre. In 1866 it was taken in the northern parts of New Hampshire and Vermont; in 1868 it had advanced as far

South as Lake Winnepesaugee. It having since been taken at Bangor, and at other points in Maine; in certain parts of New Jersey and the past year around Boston and New York.

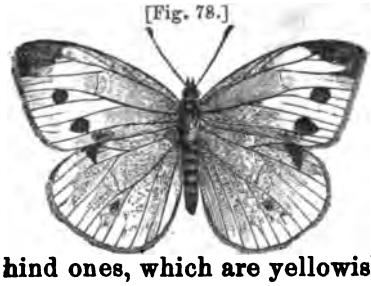
It was in all probability introduced into this country in the egg state, for the eggs are deposited on the underside of the leaves, and there is nothing more likely than that a batch may have been thrown with refuse leaves from some vessel, and that after hatching the young larvæ managed to find suitable food close by.

[Fig. 77.]

The larva (Fig. 77, *a*), is pale green, finely dotted with black, with a yellowish stripe down the back, and a row of yellow spots along each side in a line with the breathing holes. When about to transform, it leaves the plant upon which it fed, and shelters under the coping of some wall or fence, or on anything that may be conveniently at hand, and changes to a chrysalis (Fig. 76, *b*) which though variable in color, is usually pale green, speckled with minute black dots. The insect passes the winter in this state and as with the two indigenous species, there are two broods each year.

The butterflies have the bodies black above, with the wings white, and marked as in the accompanying cuts; the female (Fig. 78) being distinguished from the male (Fig. 79) by having two round spots (sometimes three) instead of only one on the front wings. Underneath, both sexes are alike, there being two spots on the front wings and none on the hind ones, which are yellowish, sometimes passing into green. The species varies very much, and there is a specimen in my collection in which all the spots are so nearly obsolete above, that if it were not for the characteristic under-surfaces, it could scarcely be distinguished from the Potherb Butterfly. There is also in England a variety of the male sex which has the ground-color canary yellow instead of white, and curiously enough, this same variety has been taken in this country.

[Fig. 78.]



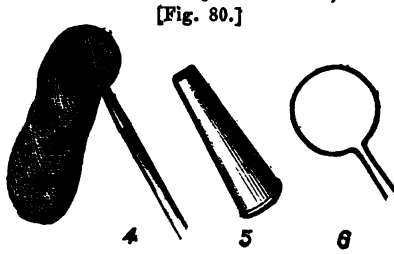
[Fig. 79.]

Although some caterpillars are polyphagous, feeding indiscriminately on a great variety of plants, yet most of them are confined to plants of the same botanical family, or at all events of the same natural order. Such is the case with the two indigenous cabbage butterflies above mentioned, for they are not known to go beyond cruciferous plants for food. The Rape Butterfly has a less epicurean palate however, and departs from this rule, inas-

much as it has been known to feed upon the weeping willow in England.

REMEDIES.—One way of counterworking the evil effects of these cabbage butterflies, is to search for the eggs at the proper season, and destroy them. These eggs are pear-shaped, yellowish and longitudinally ribbed, but as they are deposited singly or in clusters of not more than two or three, the operation becomes tedious and somewhat impracticable on a large scale. Still, children should be taught how to find them, and incited to search for them by the hope of a reward for a certain number. The butterflies are slow lumbering flyers and may easily be caught in a net and killed. A short handle, perhaps four feet long, with a wire hoop and bag-net of muslin or musquito netting, are the only things needed to make such a net, the total cost of which need not be more than fifty or seventy-five cents. Or a more durable one may be made, in the following manner: Get a tinsmith to make a hollow handle of brass or tin from six to seven inches in length and tapering at one end, as seen in Figure 80, 5; then procure a piece of stout wire, rather more than a yard long, and bend it in the manner shown in Figure 80, 6. Place the ends of the wire in the small end of the handle, solder it on, and then fill in one-third of the handle with molten lead, so as to make the wire doubly fast and solid. Now make a bag of some strong but light fabric, and fasten it well to the wire. The depth of the bag should be more than twice the diameter of the wire hoop. If a handle is required, a wooden one is easily made to fit into the hollow brass or tin, as at Figure 80, 4. Poultry, if allowed free range in the cabbage field, will soon clear off the worms of our indigenous species.

[Fig. 80.]



4 5 6

By laying pieces of board between the cabbage rows, and supporting them about two inches above the surface of the ground, the worms will resort to them to undergo their transformations, and may then be easily destroyed.

Either Paris green or white hellebore will kill the worms, if sprinkled on to them, but cannot be used on cabbages, as it is difficult to free the plants of these substances which are poisonous. The saponaceous compounds of cresylic acid are effectual, and without these objections.

In Europe there are many parasites which serve to check the increase of the Rape Butterfly, and Curtis enumerates at least four. But on this continent, but one such parasite has so far been found to attack it, and that was a two-winged fly—probably a *Tachina* fly—which M. Provancher bred from the chrysalis, in Quebec, Can.* M. Provancher, after remarking that he found a chrysalis which, from its blacken-

*(*Naturaliste Canadien* Vol. II, p. 18.)

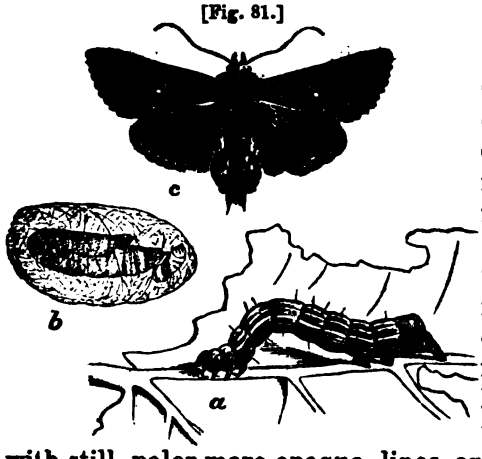
ing in the middle, he suspected would not develop into a butterfly, says of this parasite that he afterwards found a cocoon [pupa?] by its side which was smooth blackish and oblong, and so large that he could scarcely believe it had escaped from the chrysalis, which was, however, now pierced in the middle and empty. M. Provancher goes on to say: "Ten days afterwards, we perceived one morning that the cocoon was open at one end, and there was buzzing about in the vial a fly, which we recognized as belonging to the genus *Sarcophaga* [flesh-flies], the larvæ of which are known to develop in meat. Here then we exclaimed, when we saw this fly, is an enemy of the Rape Butterfly. But unfortunately the flesh-flies feed indiscriminately on almost any kind of flesh, and never being very numerous, cannot become very redoubtable enemies of this butterfly."

With all due respect to my friend Provancher, I incline to believe that he has mistaken a *Tachina* fly which is a true parasite, for a flesh-fly (*Sarcophaga*) which is only a scavenger. And if this be so, his reasoning falls to the ground, for, as we may see in the Army-worm article in this Report, there are no more efficient checks to the increase of injurious insects than these same *Tachina* flies.

THE CABBAGE PLUSIA—*Plusia brassicæ*, N. Sp.

(Lepidoptera, Plusidæ.)

[Fig. 81.]



This is the next most common insect which attacks the Cabbage with us, and curiously enough it has never yet been described It is a moth, and not a butterfly, and flies by night instead of by day. In the months of August and September the larva (Fig. 81, *a*) may be found quite abundant on this plant, gnawing large, irregular holes in the leaves. It is a pale green translucent worm, marked longitudinally with still paler more opaque lines, and like all the known larvæ of the family to which it belongs, it has but two pair of abdominal prolegs, the two anterior segments which are usually furnished with such legs in ordinary caterpillars, not having the slightest trace of any. Consequently they have to loop the body in marching, as represented in the figure, and are true "Span-worms." Their bodies are very soft and tender, and as they live exposed on the outside of the plants, and often rest motionless, with the body arched, for hours at a time, they are espied and devoured by many of their enemies, such as birds, toads, etc. They are also subject to the attacks of at least two parasites and die very often from disease, especially in wet weather;

so that they are never likely to increase quite as badly as the butterflies just now described.

When full grown this worm weaves a very thin loose white cocoon, sometimes between the leaves of the plant on which it fed, but more often in some more sheltered situation; and changes to a chrysalis (Fig. 81, *b*) which varies from pale yellowish-green to brown, and has a considerable protruberance at the end of the wing and leg cases, caused by the long proboscis of the enclosed moth being bent back at that point. This chrysalis is soft, the skin being very thin, and it is furnished at the extremity with an obtuse roughened projection which emits two converging points, and several short curled bristles, by the aid of which it is enabled to cling to its cocoon.

The moth is of a dark smoky-gray inclining to brown, variegated with light grayish-brown, and marked in the middle of each front wing with a small oval spot and a somewhat U-shaped silvery white mark, as in the figure. The male (Fig. 81, *c*) is easily distinguished from the female by a large tuft of golden hairs covering a few black ones, which springs from each side of his abdomen towards the tip.

The suggestions given for destroying the larvæ of the Cabbage Butterflies, apply equally well to those of this Cabbage Plusia, and drenchings with a cresylic wash will be found even more effectual, as the worms drop to the ground with the slightest jar.

PLUSIA BRASSICÆ, N. Sp.—*Larva*—Pale yellowish translucent green, the dorsum made lighter and less translucent by longitudinal opaque lines of a whitish-green; these consist each side, of a rather dark vesicular dorsal line, and of two very fine light lines, with an intermediate broad one. Tapers gradually from segments 1–10, descending abruptly from 11 to extremity. Piliferous spots white, giving rise to hairs, sometimes black, sometimes light colored; and laterally a few scattering white specks in addition to these spots. A rather indistinct narrow, pale stigmatal line, with a darker shade above it. Head and legs translucent yellowish-green, the head having five minute black eyelets each side, which are not readily noticed with the naked eye. Some specimens are of a beautiful emerald-green, and lack entirely the pale longitudinal lines. Described from numerous specimens.

Crysalis—Of the normal *Plusia*-form, and varying from yellowish-green to brown.

Moth—Front wings dark gray inclining to brown, the basal half line, transverse anterior, transverse posterior, and subterminal lines pale yellow inclining to fulvous, irregularly undulate, and relieved more or less by deep brown margins; the undulations of the subterminal line more acuminate than in the others, and forming some dark sagittate points; the basal half-line, the transverse anterior near costa, and the transverse posterior its whole length, being sometimes obscurely double: four distinct equidistant costal spots on the terminal half of wing, the third from apex formed by the termination of the transverse posterior; posterior border undulate with a dark brown line which is sometimes marked with pale crescents; a series of similar crescents (often mere dots) just inside the terminal space; the small sub-cellulary silver spot oval, sometimes uniformly silvery-white but more often with a fulvous centre, sometimes free from, but more often attached to the larger one which has the shape of a constricted U, very generally with a fulvous mark inside, which extends basally to the transverse anterior at costa. Fringes dentate, of the color of the wing, and with a single undulating line parallel to that on the terminal border. *Hind wings* fuliginous, inclining to yellowish towards base, and with but a slight pearly lustre; fringes very pale with a darker inner line. Under surfaces pale fuliginous with a pearly lustre, the front wings with a distinct fulvous mark under the sub-cellulary spots, speckled more or less with the same color around the borders of the wing, the fringes being dentate with light and dark; the hind wings speckled with fulvous on their basal half, and with the fringes as above. *Thorax* variegated with the same color as front wings, the tufts being fulvous inclining to

pink. *Abdomen* ♀ gray, with a few pale hairs near the base, and scarcely extending beyond the margin of the hind wings; ♂ longer, covered with pale silky hairs, a distinct dorsal brown tuft on each of the three basal segments, and two large lateral either fawn-colored or golden-yellow brushes on the fifth segment, meeting on the back and partly covering two smaller brushes on the sixth, which are tipped with black; terminal segment flattened and with two lateral more dusky and smaller tufts: underside of thorax and abdomen gray, mixed with flesh-color. Alar expanse 1.35 inches. Described from numerous bred specimens. In a suite of specimens bred from the same brood of larvæ a considerable difference in the general depth of color is found, some being fully a dark again as others.

Closely resembles *Plusia ni*, Engr., which occurs in Italy, Sicily, France, and the northern parts of America. Mr. P. Zeller of Stettin, Prussia, to whom I sent specimens, considers it distinct however from the European *ni*, and I have consequently given it a name in accordance with its habits.

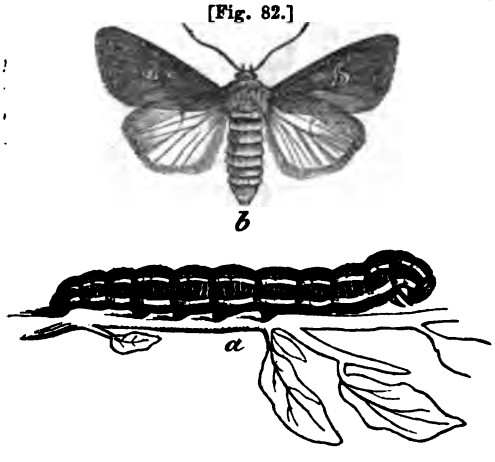
There is another worm which may be known as the Thistle Plusia, and which occurs on our common thistles, and cannot therefore be considered very injurious. It differs only from that of the Cabbage Plusia in having the sides of the head, the thoracic legs, a row of spots above the lateral light line, and a ring around the breathing pores, black. I have bred from it the *Plusia precationis** of Guenée—an insect whose larval history has not hitherto been known.

THE ZEBRA CATERPILLAR—*Mamestra picta*, Harr.

(Lepidoptera, Apamidæ.)

This is another insect which often proves injurious to our cauliflowers and cabbages, though it by no means confines itself to these two vegetables. Early in June the young worms which are first almost black, though they soon become pale and green, may be found in dense clusters on these plants, for they are at that time gregarious. As they grow older they disperse and are not so easily found, and in about four weeks from the time of hatching they come to their full growth. Each worm (Fig. 82. *a*,) then measures about two inches in length, and is velvety-black with a red head, red legs, and with two lateral yellow lines, between which are numerous transverse white, irregular, zebra-like finer lines, which induced Dr. Melsheimer to call this worm the "Zebra." Though it does not conceal itself, it invariably curls up cut-worm fashion, and rolls to the ground when disturbed.

[Fig. 82.]



It changes to chrysalis within a rude cocoon formed just under the surface of the ground, by interweaving a few grains of sand or a

* Some of these bred specimens approach very near to *Pl. tota*, Gn. and even to *Pl. u-brevis*, Gn.

few particles of whatever soil it happens on, with silken threads. The chrysalis is ½ of an inch in length, deep shiny brown and thickly punctured except on the posterior border of the segments and especially of those three immediately below the wing-sheaths, where it is reddish and not polished; it terminates in a blunt point ornamented with two thorns. The moth (Fig. 82, *b*,) which is called the Painted Mamestra, appears during the latter part of July, and it is a prettily marked species, the front wings being of a beautiful and rich purple-brown, blending with a delicate lighter shade of brown in the middle; the ordinary spots in the middle of the wing, with a third oval spot more or less distinctly marked behind the round one, are edged and traversed by white lines so as to appear like delicate net-work; a transverse zigzag white line, like a sprawling W is also more or less visible near the terminal border, on which border there is a series of white specks; a few white atoms are also sprinkled in other places on the wing. The hind wings are white, faintly edged with brown on the upper and outer borders. The head and thorax are of the same color as the front wings, and the body has a more grayish cast. There are two broods of this insect each year, the second brood of worms appearing in the latitude of St. Louis from the middle of August along into October, and in all probability passing the winter in the chrysalis state, though a few may issue in the fall and hybernate as moths, or may even hybernate as worms; for Mr. J. H. Parsons, of N. Y., found that some of the worms which were on his Ruta Baga leaves, stood a frost hard enough to freeze potatoes in the hill, without being killed.* I have noticed that the spring brood confines itself more especially to young cruciferous plants, such as cabbages, beets, spinach, etc., but have found the fall brood collecting in hundreds on the heads and flower-buds of asters, on the White-berry or Snow-berry (*Symphoricarpus racemosus*); on different kinds of honey-suckle, on mignonette, and on asparagus: they are also said to occur on the flowers of clover, and are quite partial to the common Lamb's-quarter or Goosefoot (*Chenopodium album*).

On account of their gregarious habit when young, they are very easily destroyed at this stage of their growth.

THE TARNISHED PLANT-BUG—*Capsus oblineatus*, Say.†

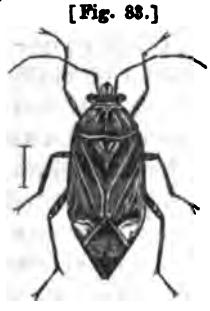
[Heteroptera Capsidæ.]

Quite early last spring while entomologizing in Southern Illinois,

* *Practical Entomologist*, II, p. 21.

† This bug was originally described by Beauvois as *Coreus lineatis*, and subsequently as *Capsus oblineatus* by Say. Harris in speaking of it refers it to the sub-genus *Phytocoris* Fallen, and by mistake, changes Beauvois' specific name *lineatis*, to *lineolaris*, which he translates into popular language as the "Little-lined Plant-bug." As Say's description is the only one I have access to, I have retained the name he gave it, as being eminently appropriate.

[Fig. 83.]



I spent a day with Mr. E. J. Ayres of Villa Ridge, and was surprised to learn that he had become quite discouraged in his efforts to grow young pear trees, on account of the injuries of a certain bug, which upon examination I found to be the Tarnished Plant-bug, represented enlarged at Figure 83, the hair line at its side showing the natural size. The family to which this bug belongs is the next in a natural arrangement to that which includes the notorious Chinch-bug, and the insect is, like that species, a vegetable bug, and obtains its food by *sucking* and not *biting*. The *Capsus* family is a very large one, containing numerous species in this country, but among them, none but the species under consideration have thrust themselves upon public notice by their evil doings.

The Tarnished Plant-bug is a very general feeder, attacking very many kinds of herbaceous plants, such as dahlias, asters, marigolds, balsams, cabbages, potatoes, turnips, etc.; and several trees, such as apple, pear, plum, quince, cherry, etc. Its puncture seems to have a peculiarly poisonous effect, on which account, and from its great numbers, it often proves a really formidable foe. It is especially hard on young pear and quince trees, causing the tender leaves and the young shoots and twigs to turn black, as though they had been burned by fire. On old trees it is not so common, though it frequently congregates on such as are in bearing, and causes the young fruit to wither and drop. I have passed through potato fields along the Iron Mountain Railroad in May, and found almost every stalk blighted and black from the thrusts of its poisonous beak, and it is not at all surprising that this bug was some years ago actually accused of being the cause of the dreaded potato-rot.

This bug is a very variable species, the males being generally much darker than the females. The more common color of the dried cabinet specimens is a dirty yellow, variegated as in the figure with black and dark brown, and one of the most characteristic marks, is a yellow V, sometimes looking more like a Y, or indicated by three simple dots, on the scutel, (the little triangular piece on the middle of the back, behind the thorax). The color of the living specimens is much fresher, and frequently inclines to olive-green. The thorax, which is finely punctured, is always finely bordered and divided down the middle with yellow, and each of the divisions contains two broader logitudinal yellow lines, very frequently obsolete behind. The thighs always have two dark bands or rings near their tips.

As soon as vegetation starts in the spring, the mature bugs which winter over in all manner of sheltered places may be seen collecting on the various plants which have been mentioned. Early in the morning they may be found buried between the expanding leaves, and at this time they are sluggish and may be shaken down and destroyed; but as the sun gets warmer, they become more active, and

when approached, dodge from one side of the plant to the other, or else take wing and fly away. They deposit their eggs and breed on the plants, and the young and old bugs together may be noticed through most of the summer months. The young bugs are perfectly green, but in other respects do not differ from their parents except in lacking wings. They hide between the flower-petals, stems and leaves of different plants, and are not easily detected. Late in the fall, none but full grown and winged bugs are to be met with, but whether one or two generations are produced during the season I have not fully ascertained, though in all probability there are two.

Remedies.—In the great majority of cases, we are enabled to counteract the injurious work of noxious insects, the moment we thoroughly comprehend their habits and peculiarities. But there are a few which almost defy our efforts. The Tarnished Plant-bug belongs to this last class, for we are almost powerless before it, from the fact that it breeds and abounds on such a great variety of plants and weeds, and that it flies so readily from one to the other. Its flight is however limited, and there can be no better prophylactic treatment than clean culture; for the principal damage is occasioned by the old bugs when they leave their winter quarters and congregate on the tender buds and leaves of young fruit stock; and the fewer weeds there are to nourish them during the summer and protect them during the winter, the fewer bugs there will be. The small birds must also be encouraged. Applications of air-slacked lime and sulphur, have been recommended to keep them off, but if any application of this kind is used, I incline to think that to be effectual, it must be of a fluid nature; and should recommend strong tobacco-water, quassia-water, vinegar, and cresylic soap. Some persons who have used the last compound have complained that it injures the plants, and every one using it should bear in mind, what was stated in the preface to my First Report, namely, that the pure acid, no matter how much diluted with water, will separate when sprinkled, and burn holes in, and discolor plant texture; while if properly used as a saponaceous wash it will have no such injurious effect. It must likewise be borne in mind, that the so called "plant-protector" which is a soap made of this same acid, will bear very much diluting, (say one part of the soap to fifty or even one hundred parts of water) and that it will injure tender leaved plants if used too strong. I have noticed that the bugs are extremely fond of congregating upon the bright yellow flowers of the Cabbage, which, as every one knows, blooms very early in the season; and it would be advisable for persons who have been seriously troubled with this bug, and who live in a sufficiently southern latitude where the plant will not winter-kill, to let a patch of cabbages run wild and go to seed in some remote corner of the farm, in order that the bugs may be attracted thither and more readily destroyed, than when scattered over a larger area.

THE PHILENOR SWALLOW-TAIL—*Papilio philenor*, Drury.

(Lepidoptera Papilionidæ.)

There is a genus of climbing plants (the Aristolochias), which is peculiarly attractive on account of its large, rich tropical-looking foliage. The Aristolochias are represented in almost all parts of the world, and some of the tropical species bear beautiful and immense flowers. In this country we have three native species which produce but small, pipe-like flowers, but which make very pretty ornaments for covering walls and arbors or for ornamenting trellises and screens. The most common and best known species in this State is the so called Dutchman's Pipe (*Aristolochia sipho*), but the two other species (*A. serpentaria* and *A. tomentosa*) are also cultivated.

[Fig. 84.]

In the beautiful botanical grounds of Mr. Shaw, at St. Louis, there are some magnificent specimens of the Dutchman's Pipe, and about the end of last July, these had all been suddenly defoliated. I was invited to go and examine the cause and propose some remedy. I found the vines literally denuded, for there was not a whole leaf upon them, those that were not entirely eaten off down to the stem, being riddled with different sized holes. Upon a close examination, the authors of the mischief were soon found, in the shape of the peculiarly horned caterpillar, represented at Figure 84; but as there were few large specimens to be found, it was quite evident that the great bulk of them had acquired their growth, and had already left the vines for some more sheltered situation, in which to transform to the chrysalis state. There were, however, a sufficient number of smaller or more recently hatched individuals, had they remained undiscovered, to have soon taken every vestige of the few imperfect leaves remaining; while the beautiful butterflies which produced these worms were noticed flitting around the vines.

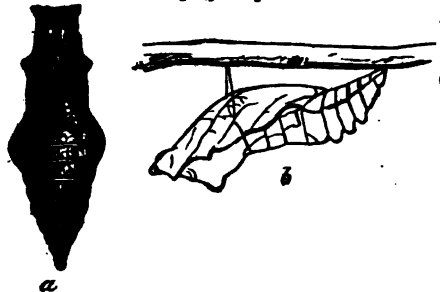
This insect is found on no other plants but the Aristolochias. The worms commence to hatch in this latitude by the beginning of July, from eggs deposited on the leaf; and individuals may be found as late as the last of August. They live in company, especially while young, and cover the leaves with zigzag lines of silk, which enable them the better to crawl about and hold on to the vines. The newly hatched worm is dark brown, with no spots, and with quite short tubercles. After the first month they become lighter colored, with the tubercles on the back of segments 6, 7, 8 and 9, of an orange color, and some of the other tubercles, especially the two on the first segment, proportionally longer than the rest. After the second

moult the color of the body becomes still lighter, some of the tubercles still proportionally longer and longer, and those on the back all begin to appear orange; while a distinct orange spot becomes visible between the long horns on the first segment, from which spot the soft, forked orange scent-organs are thrust. After the third moult but very little change takes place, and after the fourth moult, the worm loses in a great measure its shiny appearance, becomes more velvety and darker, and when full grown presents the appearance of Figure 84, and may be described as follows:

Length, two inches. Color velvety black, with a slight purplish or chesnut-brown hue. Covered with long fleshy tubercles of the same color as body, and shorter orange colored tubercles, as follows: Two, which are brown, long, tapering and feeler-like, springing anteriorly one from each side of joint 1, the two being movable, and alternately applied to the surface upon which the worm moves. Joint 2, with two brown tubercles, one springing from each side with a downward curve, and each about one-third as long as those on joint 1; also with two small dorsal, wart-like orange tubercles. Joints 3 and 5 exactly like joint 2, but on joint 4 the lateral brown tubercle is replaced by a wart-like orange one. Joints 6, 7, 8 and 9, each with two small dorsal orange tubercles, and each with a lateral, elongated, pointed, brown, downwardly curved one, arising from the base of prolegs. Joints 10 and 11 also with these lateral tubercles, but the orange dorsal ones replaced by longer pointed curved brown ones, which however often have an orange base. Joint 12 with two somewhat stouter dorsal brown tubercles, but none at sides. Joints 7, 8, 9 and 10, each with a lateral orange spot just before and above the spiracles, which are sunk into the flesh and scarcely perceptible. Head, legs, venter and cervical shield the same color as body, the venter with two tubercles on joint 5, which much resemble prolegs, the cervical shield, with an orange transverse spot on anterior edge, from which is thrust the osmaterium.

When full grown this tubercled worm fastens itself by its hind legs and by a silken loop drawn between joints 5 and 6, and in about two days changes to a chrysalis, of which Figure 85, *a*, gives a shaded back-view, and *b* a lateral outline. This chrysalis is at first yellowish-green, but soon becomes beautifully marked with gray and violet, and more or less with yellow on the back: and it is readily distinguished from all other chrysalides of North American butterflies belonging to the same genus (*Papilio*) by two trigonate prominences on the head which give it a square appearance; by a very prominent trigonate projection on the top, and a lesser one each side of thorax; by the wing-sheaths being much dilated and sharply edged above, and by six prominent, rounded, narrow-edged, longitudinal projections on the top of the three principal abdominal joints.

[Fig. 85.]

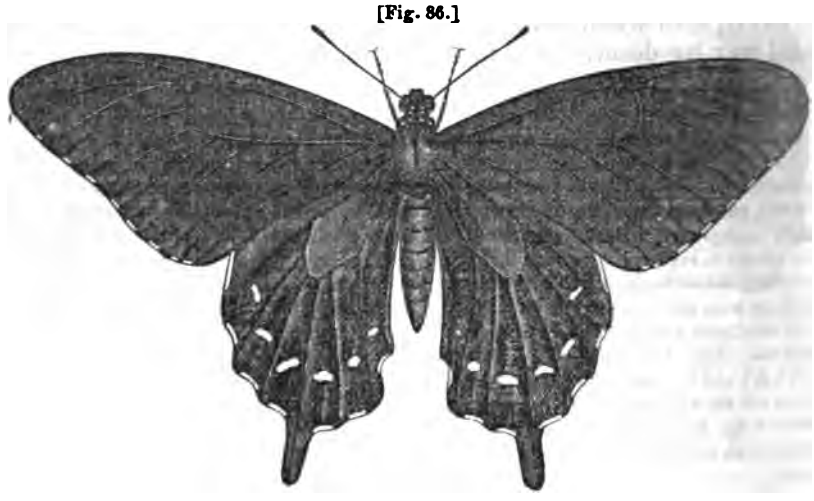


a

The butterfly which issues from this chrysalis in about three weeks, is such a delicate and elegant object, that it is next to impossible to give a just illustration of it. The front wings are black with a greenish metallic reflection on the nerves and along the front and hinder borders, and a row of white spots near the hinder border, which is very slightly undulate, with a narrow cream-colored mark on

the inner sinuses. The hind wings are of a brilliant steel-blue, with a greenish cast, with a carved row of white lunules and with the hinder border quite undulate and the inner sinuses cream-colored. The under surface of the front wings is more sombre than the upper surface, with the spots near the borders and the marginal lunules more distinct. The under surface of the hind wings, is on the con-

[Fig. 86.]



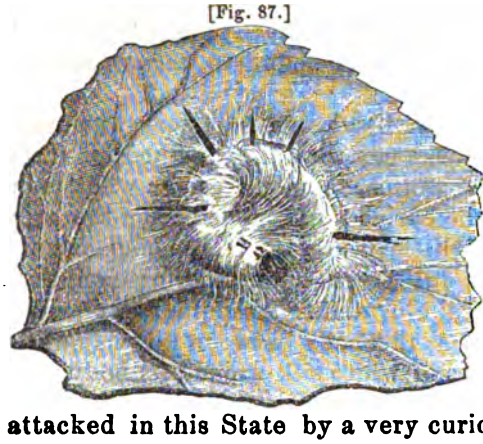
trary, with the exception of a large almost oval patch at base, of a very brilliant steel blue, with a curved row of seven rounded spots of a deep orange, bordered with black, and the four or five upper ones edged above with white; there is a small yellow basal spot, about five small whitish spots around the lower borders of the large sombre oval patch, and the marginal lunules are much more distinct than on the upper surface. The male which I illustrate (Fig. 86) differs from the female in the more brilliant hue of the upper surface, and in either entirely lacking the row of white spots near the hinder border of the front wings, or in having but the faintest trace of them.

As these Aristolochia worms are semi-gregarious, and as when young, all the individuals of a batch may be found close together, they are easily destroyed, and those persons who cultivate the Aristolochias, need never be troubled with this insect, if they will examine the vines carefully during the first half of July. The worms invariably produce butterflies during the fall months, and the insect consequently hybernates in the perfect or butterfly state. As the worms feed only on the Aristolochias, scarcely a plant of the kind can be grown without sooner or later being attacked, and the gardener should always keep a watchful eye for the worms, about the time indicated.

THE COTTONWOOD DAGGER—*Acronycta populi*, N. Sp.

(Lepidoptera Acronyctadæ.)

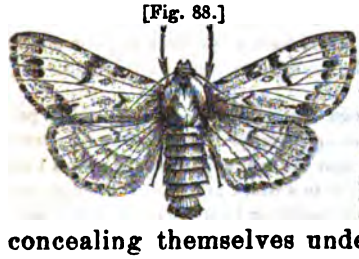
[Fig. 87.]



The Cottonwood tree (*Populus monilifera*), though not very generally cultivated in the more thickly settled parts of the country, is yet a valuable tree, especially in the newly settled parts of the West, where by its rapid growth and large foliage, it soon furnishes both wood and shade on the bleak treeless prairies. Besides several borers which eat into the trunk and root, it is attacked in this State by a very curious lazy caterpillar, which devours the foliage, and not unfrequently strips the tree.

This caterpillar (Fig. 87) when full grown, rests curled round upon the leaf, and is easily recognized by its body being covered with long soft bright yellow hairs which grow immediately from the body, part on the back, and curl round on each side. It has a shiny black head, black spots on the top of joints 1 and 2, and a straight black brush on top of joints 4, 6, 7, 8 and 11. There are two broods of these worms each year, the first brood appearing during the month of June and producing moths by the last of July, the second brood appearing the last of August and throughout September, and passing the winter in the chrysalis state. The chrysalis is dark shiny brown, and ends in an obtuse point which is furnished with several hooked bristles. It is formed within a pale yellow cocoon of silk intermingled with the hairs of the caterpillar, and is generally built in some sheltered place, such as a chink in the bark of a tree, or under the cap of some fence.

[Fig. 88.]



The moth (Fig. 88, ♀) is of a pale gray, marked with black as in the figure. It belongs to a night-flying genus (*Acronycta*) of true Owlet-moths, very closely allied to our common cut-worm moths; and yet the larvæ belonging to this genus have none of them the cut-worm habit of concealing themselves under ground, and are exceedingly heterogeneous among themselves. Some are furnished with long soft hairs like the species under consideration; some with prominent hairy warts; some have protuberances on certain segments; some are furnished with brushes; others not, etc., etc. But notwithstanding this dissimilarity among the larvæ of the genus, the moths bear very close

resemblances to one another, and in some cases it is not easy to separate them without knowing the larvæ. Our Cottonwood species has never been described. It bears a strong resemblance to several European species, but as it would only weary the general reader to give the details wherein it differs from those already described, which closely resemble it, these details will be found to accompany the scientific description below.

This insect would undoubtedly become much more numerous and troublesome, were it not for the fact that it is pursued by three distinct parasites. Many of the worms when full grown will fasten themselves firmly to a leaf in the curled position, and from the body will issue from thirty to forty little maggots. These maggots are each of them 0.17 inch long, of a dull green color, tapering each way, with a dark dorsal mark, a lateral elevated ridge, and a row of shiny elevated spots of the same color as the body between this ridge and the back. Each one spins a mass of white silk around its body, and creeps out of it and commences spinning afresh, until at last a large aggregate amount of flossy silk is spun, into which the maggots work back to transform, though some transform while lying on the surface. These maggots eventually produce a little black Ichneumon-fly belonging to the genus *Microgaster*.* Another and larger undetermined Ichneumon-fly belonging to the genus *Ophion*, also attacks this Cottonwood worm, and it is also occasionally infested with a *Tachina*-fly larva.

These worms are most easily destroyed when young, for though not strictly gregarious, they do not then scatter much from the branch upon which they were born.

ACRONYCTA POPULI, N. Sp.—*Larva*—Length 1.50. Color yellowish-green, covered with long soft bright yellow hairs which spring immediately from the body, part on the back, and curl round on each side. On top of joints 4, 6, 7, 8 and 11, a long straight double tuft of black hairs, those on 7 and 8 the smallest. Head polished black with a few white bristles. Joint 1 with a black spot above, divided longitudinally by a pale yellow line, giving it the appearance of a pair of triangles. Joint 2 with two less distinct black spots. Thoracic legs black; prolegs black with brownish extremities. Venter greenish-brown. Described from many specimens. When young of a much lighter color, or almost white, with the black tufts short but more conspicuous, with a distinct black dorsal line, two lateral purplish-brown bands, and with hairs white, sparse and straight.

Individuals vary much: some have a black dorsal line, some have but three distinct black tufts; some have a 6th tuft of black hairs on joint 9, and others have a few black hairs on all but the thoracic joints. Just before spinning up, many of the hairs are frequently lost, and the body acquires a dull livid hue.

Moth.—♀, Front wings, white, finely powdered with dark atoms which give them a very pale gray appearance; marked with black spots as follows: a complete series of small spots on posterior border extending on the fringes, one between each nerve; near the anal angle between nerves 1 and 2 a large and conspicuous spot bearing a partial resemblance to a Greek φ, placed sidewise, and from this spot a somewhat zigzag line running parallel with posterior border, but somewhat more arcuated towards costa, least distinct between nerves 3 and 4, and forming a large distinct dart-like spot between nerves 5 and 6; space between this line and posterior border, slightly darker than the rest of the wing-surface on account of the dark atoms being more thickly sprinkled over it; four costal marks, one subobsolete in a transverse line with the reniform spot, one conspicuous about the middle, and in a line with reniform spot and anal angle, one about the same size as the last, and looking like a blurred X about one-third the length of wing from base, and one subob-

*Microgaster acronyctæ of my MS.

aolet, near the base; orbicular spot flattened and well defined by a black annulation; reniform spot indicated by a blurred black mark running on the cross-vein and sometimes somewhat crescent-formed; a V-shaped spot pointing towards base half-way between costa and interior margin, in a transverse line with the large costal spot which looks like a blurred X; a blurred mark in middle at base, and lastly a narrow spot on the inferior margin, half-way between base and anal angle. Hind wings same color as front wings; somewhat more glossy, with the lunule, a band on posterior border one-fourth the width of wing, and sometimes a narrow coincident inner line, somewhat darker than the rest; the posterior border also with a series of spots one between each nerve. Under surface of front wings pearly-white with an arcuated brown band, most distinct towards costa, across the posterior one-third, all inside of this band of a faint yellowish-brown; lunule and fringe spots distinct, and with a faint trace of the *psi*-spot; hind wings uniform pearly-white with a distinct and well defined dark wavy line running parallel with posterior margin across the posterior one-third of wing, and with the lunule and fringe spots distinct. Antennæ simple and bristle-formed, gray above, brown beneath. Head thorax and body, both above and below, silvery-gray. Legs with the tarsi alternately dusky and gray. ♂ differs from ♀ by his somewhat stouter antennæ; much narrower body, and narrower wings and fringes, the front wings having the apex more acuminate, and the hind wings scarcely showing the darker hind border.

Described from 2 ♀, 2 ♂ all bred. In the ornamentation of the front wings this species bears some resemblance to the European species *tridens* and *psi*, but otherwise differs remarkably, and especially in its larval characters. It bears a still closer resemblance both in the larva and imago state to the pale variety of a common species known in England as the "Miller" (*A. leporina*), but judging from the figures and description in "Newman's Natural History of British Moths," it may be easily distinguished from *leporina* by the well defined orbicular spot, by the greater proximity of the two large costal spots, by lacking a round spot behind the disk, and by the more prolonged apex. It differs also in the larva state from *leporina* which feeds on the Birch. It likewise closely resembles *interrupta*, though the larvæ are remarkably different; and it also resembles *lepusculina*, the larva of which is unknown; but the specific differences will be readily perceived upon comparing Guenée's descriptions. How near it approaches to *Acronycta occidentalis*, Grote,* it is impossible to tell, as the author's description is exceedingly brief, considering the number of closely allied forms; but as that species has a bright testaceous tinge on the reniform spot, it evidently differs from mine. Harris's *Apatela* [*Acronycta*] *Americana*,† though very different in the imago, yet closely resembles *populi* in the larva state. I have on two occasions found the larva of *Americana* feeding on the Soft Maple, and it may be distinguished from *populi*, by its greater size; by the paler color of the body; by the hairs being paler, more numerous, shorter and pointing in all directions, especially anteriorly and posteriorly of each segment; by having on each of joints 4 and 6 two distinct long black pencils, one originating each side of dorsum, and on joints 11 one thicker one originating from the top of dorsum; by a substigmatal row of small black spots (three to each segment, the middle one lower than the others) and by a trapezoidal velvety black patch starting from anterior portion of joint 11 and widening to anus.

THE MISSOURI BEE-KILLER—*Asilus Missouriensis*, N. Sp.

(Diptera Asilidæ.)

On page 168 of my First Report an account is given, with a very poor figure, of a large two-winged fly which was first received by Dr.

*Proc. Ent. Soc. Phil., VI, p. 16.

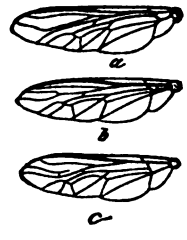
†I am surprised that Dr. Morris (*Harr. Inj. Insects*, p. 436, Note) refers this species to Guenée's *scricola*, when the larva of the latter, as described by Guenée himself, is so different and feeds withal on Birch and Alder, and not on either Maple, Elm, Linden or Chesnut.

[Fig. 89.]

Fitch, of New York, from Mr. R. O. Thompson of this State, who found that it had the pernicious habit of catching and sucking out the juices of the common honey-bee. Dr. Fitch referred this fly to the genus *Trupanea*, and called it the Nebraska bee-killer, from its having first been captured by Mr. Thompson in Nebraska, where he at that time resided. The great German Dipterist, H. Loew, as I am informed by Baron Osten Sacken of New York, ignores and has discontinued the genus *Trupanea*, substituting in its place that of *Promachus*; and Fitch's *Trupanea apivora* is the very same species previously described by Loew as *Promachus Bastardii*, and it is one of the most common species, occurring very generally over the United States.

I find that we have in Missouri a somewhat larger fly (Fig. 89) which has the same pernicious habit of seizing and destroying the honey-bee in preference to all other kinds of prey. It acts in exactly the same manner as the Nebraska Bee-killer, being, if anything, more inhuman and savage. It belongs to the typical genus *Asilus*, and I have called it the Missouri Bee-killer (*Asilus Missouriensis*). Though bearing a casual resemblance to the Nebraska Bee-killer, it may very readily be distinguished from that species, and especially by the different venation of the wings.

[Fig. 90.]



The three more common genera of these voracious *Asilus* flies, may easily be distinguished from each other by the character of these wing-nerves. In the typical genus *Asilus* to which belongs our Missouri Bee-killer, the *third* longitudinal vein is forked near the terminal *third* of the wing, and the vein itself is connected about the middle of the wing, with the fourth longitudinal, as in Figure 90, *b*. In the genus *Promachus*, to which the Nebraska Bee-killer belongs, it is the *second* (not the third) longitudinal vein which is forked near the *middle* of the wing, and the third branch of this fork is connected by a slender cross-vein to the third longitudinal, near the terminal third of the wing, as in Figure 90, *a*. In the genus *Erax*, which generally comprises smaller species, the venation is similar to that of *Asilus*, but the upper branch of the fork, instead of joining the third longitudinal vein, is abruptly broken off and connected only near its termination by a transverse vein, as in Figure 90, *c*.

ASILUS MISSOURIENSIS N. SP.—Alar expanse 1.85; length of body 1.30 inches. *Wings* transparent, with a smoky yellow tinge, more distinct around the veins, which are brown. *Head* pale yellow, sometimes brownish; moustache straw-yellow with a few stiff black hairs below; beard pale straw-yellow; crown very deeply excavated; base of the same pale yellow with *short, stiff*

yellowish hairs, and a crown of black ones near the border; eyes large, prominent, finely reticulated and almost black; antennæ, first joint black tipped with brown, cylindrical and hairy; second joint black, short, thick and rounded at tip, with a few stiff hairs; third joint as long as first, tapering each way, smooth, black and terminating in a long, brown bristle; proboscis black and nearly as long as face; neck with pale and black hairs. *Thorax* leaden-black, slightly opalescent with reddish brown at sides, more or less pubescent with pale yellow, especially laterally and posteriorly and in three narrow longitudinal dorsal lines which gradually approach towards metathorax; bearded at sides and behind with a few decurved black bristles, those behind interspersed with a few smaller pale hairs; scutel of the same color, with upward-curving, black bristles; halteres brown. *Abdomen*, ♂, general color dull leaden-yellow, with darker transverse bands at insections; the light color produced by a yellowish pubescence and numerous short close-lying yellow hairs, the dark bands produced by the absence of this covering at the borders of each segment; basal segment broad, bilobed, and with lateral black bristles; segments 6, 7, 8 and anal valves with a decided pink tint, especially 7; 8 but one-third as long as 7 above. ♀, broader, flatter, more polished and brassy, with no transverse darker bands, segments 7 and 8 polished black, the latter narrow and longer than any of the others: anus with a few black bristles. *Legs*, dull purple-brown, with black bristles; thighs very stout, the hind pair rather darker than the others, the two front pair of trochanters with long, yellowish hairs; pulvilli, generally fulvous.

Described from two ♂, and two ♀, all captured while sucking honey-bees. I have not access to Loew's descriptions, and cannot therefore compare it with already described species; but specimens have been sent to Dr. Wm. LeBaron, of Geneva, Illinois, and to Baron Osten Sacken, of New York, and both these gentlemen are unacquainted with it, and believe it to be new. In the well marked ♂ specimens, the body bears a general resemblance to that of *Trupanea* [*Promachus*] *vertebrata*, Say.

Of course the apiarian will care very little to know which of these two Bee-killers is weakening his swarms. They should both be unmercifully destroyed, and though very strong and rapid flyers, they may be easily caught when they have settled on any little prominence with a bee in their grasp; for they are so greedy of the bee's juices that they are at this time less wary, and even when disturbed, will fly but a few yards away before settling again. A net such as that described in the article on "Cabbage worms" will be found useful in catching these mischievous flies.

The habits and preparatory stages of our *Asilus* flies are not very well known. They are all cannibals in the fly state, sucking out the juices of their victims with the strong proboscis with which they are furnished, and by which they are capable of inflicting a sharp sting on the human hand. The larvæ are footless, and live in the ground, and such as are known in this state are strangely enough, vegetable-feeders.

[Fig. 91.]

The only N. A. species that has heretofore been bred to the perfect state, is the Silky Asilus (*Asilus sericeus*, Say., Fig. 91) belonging to the typical genus *Asilus*. Its larva feeds upon the roots of the Rhubarb, and was bred to the perfect state by Dr. Harris (*Inj. Insects*, p. 605). I have succeeded in breeding to the fly state another species, belonging however to the genus *Erax*, and subjoin a description of the larva, as it is of considerable scientific interest. The fly is figured below (Fig. 93 *a*).

[Fig. 92.] ERAX BASTARDI (?)—*Larva*—(See Fig. 92.) Length 1.05 inches. Only twelve joints, the three anterior and the three posterior ones tapering gradually, the rest of equal width; slightly depressed; translucent yellowish-white, the chitinous covering tolerably firm however; a swollen lateral ridge; two rufous dorsal spiracles on joint 1 and two similar ones on joint 11. Head dark brown, very retractile, pointed, divided at tip into two mandibulate points, and having two unguiform appendages; anal segment with two depressed longitudinal lines above, ridged on anterior edge and with a central depressed line below. It makes use of its head in crawling.

Pupa—(Fig. 93 *b*). Stout, honey-yellow; the leg and wing-sheaths soldered together though separated from the abdomen; eyes large and dark; head with two large brown spines in front, and a lateral set of three rather smaller ones; thorax with two small thin rounded dorsal projections and a set of two small lateral spines just behind the head; abdomen, with each segment ridged in the middle and furnished on this ridge with a ring of brown blunt thorns sloping backwards; anal segment with a few rather stouter spines.

[Fig. 93.]

a

b

Two specimens, one found by Mr. G. C. Brodhead of Pleasant Hill, Mo., under a peach tree, the other by Mr. G. Pauls of Eureka, Mo., under a "creeping vine" of which he did not know the name. They were found full grown in May, and gave out the flies the fore part of July. Both produced ♀♀, on which account the species cannot be determined with absolute certainty. Osten Sacken informs me that it is allied to *tabescens* Loew, but is different. It is marked *fictor* in my MS., but from Macquart's description of *Bastardi*, and from ♂ and ♀ specimens of that species kindly furnished by Dr. Le Baron, I feel pretty confident that it is ♀ of that species, which is described as follows: *Abdominis segmentis tribus apicalibus niveis* ♂: *omnibus segmentis albido marginatis* ♀. *Pedibus nigris: tibiis rufis: alis flavidis. Long.* 7½ l. He then adds: "Face and front black with gray down; moustache with the upper half black and lower half white; as also the beard. The middle band of thorax divided. The first four segments of the abdomen with the posterior and lateral borders whitish. Extremities of the legs black. From North America. From 3 ♂, I have seen one which had the four terminal segments of the abdomen white." My females accord very well with this description so far as it goes, though I cannot see why Macquart restricts the whitish borders to the first four segments in the French description, when in the Latin it is stated that all the segments are so bordered, which is the case with my specimens.

INNOXIOUS INSECTS.

THE GOAT-WEED BUTTERFLY—*Paphia glycerium*, Doubleday.

[Lepidoptera, Nymphalidæ.)

[Fig. 94.]

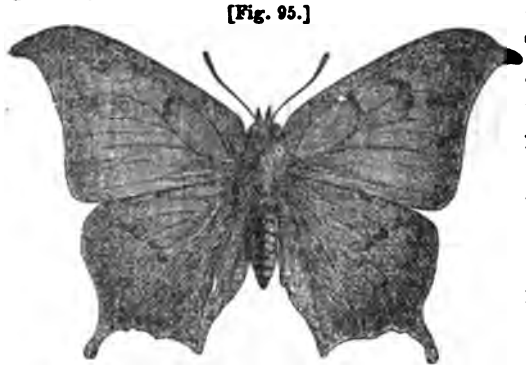
There is is an interesting and rare butterfly known to entomologists by the name of *Paphia glycerium*, which occurs in Missouri, Texas and Illinois, and perhaps in other southwestern States. It is an interesting species on account of the dissimilarity of the sexes, and of the position it holds among the butterflies; and as its natural history was unknown till the present year, I will transcribe from the *American Entomologist*, the following account of it, which I was enabled to prepare from specimens kindly sent to me last September by Mr. J. R. Muhleman, of Woodburn, Ills., and from further facts communicated by Mr. L. K. Hayhurst, of Sedalia, Mo.

Dr. Morris, in his "Synopsis of the Lepidoptera of North America," places this butterfly with the *Nymphalis* family, of which the Disippus Butterfly (*Nymphalis disippus*, Godt.), is representative. The larva, however, has more the form and habits of that of the Tityrus Skipper (genus *Goniloba*), while singularly enough, the chrysalis resembles that of the Archippus Butterfly (genus *Danais*).

The larva feeds on an annual (*Croton capitatum*) which is tolerably common in Missouri, Illinois, Kentucky, and westward, where it is known by the name of Goat-weed, and as no value whatever is at-

tached to it, the insect which attacks it cannot be classed among the injurious species. The plant has a peculiar wooly or hairy whitish-green appearance, and in the month of September its leaves may frequently be found rolled up after the fashion shown at the left of Figure 94, with the larva inside. This roll of the leaf is generally quite uniform, and is made in the following manner: Extending itself on the midvein, with its head towards the base of the leaf the larva attaches a thread to the edge, at about one-fourth the distance from the base to the point. By a tension on this thread, it draws this edge partly toward the opposite one, and fastens it there, being assisted in the operation by the natural tendency of the leaf to curl its edges inwards. Fastening a thread here, it repeats the operation until the edges meet, and then it proceeds to firmly join them nearly to the apex, leaving a small aperture through which to pass the excrement. During hot days the larva remains concealed in the leaf, and towards evening comes out to feed, though sometimes it feeds upon its house, eating the leaf down half way from base to point. It then abandons it and rolls up a new one. In the breeding cage, when placed in a cool shady room, the larva seldom rolls up the leaves, but feeds at random over the plant, and when at rest simply remains extended on a leaf. From this we may infer that its object in rolling the leaves is to shield itself from the rays of the hot August and September sun; for the plant invariably grows on high naked prairies.

[Fig. 95.]

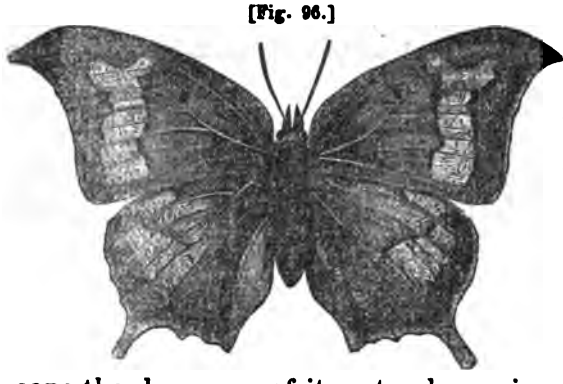


The young larva has a large head, larger than the third segment, which is the largest in the body. The head preserves its general form through the successive moults; it is light bluish, thickly covered with papillæ of a dirty-white color, and there are also a number of light orange papillæ of a larger size scattered among them. The skin of the caterpillar is *green*, but the general hue is a dirty-white, owing to the entire surface being very closely studded with white or whitish papillæ with dark-brown ones interspersed. These prominences are hemispherical, hard, opaque, shining, and the larva feels rough and harsh to the touch.

At each moult some of these papillæ disappear, especially *all* the brown ones, the body increases in size so that the head is smaller than the third segment, the green color of the skin becomes more apparent, the body is softer to the touch, and the whole larva assumes a neater appearance.

Thus this larva has very much the same peculiar whitish glaucous-green color as the plant on which it feeds; and any one who has seen it upon the plant, cannot help concluding that it furnishes another instance of that mimickry in Nature, where an insect, by wearing the exact colors of the plant upon which it feeds, is enabled the better to escape the sharp eyes af its natural enemies. When full-grown, which is in about three weeks after hatching, this worm (Fig. 94, *a*) measures 1½ inches, and although, as above described, the little elevations frequently disappear so that it looks quite smooth, yet sometimes they remain until the transformation to chrysalis takes place, as was the case with two which I bred.

[Fig. 96.]



PAPHIA GLYCERIUM.—*Full-grown larva*—Length 1.50 inches. Cylindrical. General appearance shagreened, pale glaucous-green, lighter above stigmata than elsewhere. Ground-color, of body clear green. Thickly covered with white papillæ or granulations, which are often interspersed with minute black or dark-brown sunken dots. Head quite large, (rather more than ½ as large as the third segment), nutant, subquadrate, bilobed, granulated like the body, but with the black sunken dots more numerous, and having besides, several larger granulations above, some four of which are generally black and the rest fulvous; a row of three very distinct eye-spots at the base of palpi; the triangular V-shaped piece elongated and well defined by a fine black line, and divided longitudinally by a straight black line; palpi and labrum pale, the latter large and conspicuous; jaws black. Neck narrow, constricted, green, smooth, and retractile within first segment. Segments 1—3 gradually larger and larger; 3 to last gradually smaller. Stigmata fulvous. Venter less thickly granulated than tergum. Described from five full-grown specimens received from Mr. Muhleman.

Preparatory to transforming, it suspends itself by the hind-legs to a little tuft of silk which it had previously spun, and after resting for about twenty-four hours with its head curled up to near the tail, it works off the larval skin and becomes a chrysalis, which in from two to three weeks afterwards gives out the butterfly. This chrysalis (Fig. 94, *b*) is short, thick, rounded, and of a light green; sometimes becoming light gray, and being finely speckled and banded with dark gray. The skin is so thin and delicate that the colors of the butterfly may be distinctly seen a few days before it makes its escape.

The male butterfly (Fig. 95), is of a deep coppery-red on the upper side, bordered and powdered and marked with dark purplish-brown, as shown in the figure. The under side is of a *feuille morte* brown with a greasy lustre, the scales being beautifully shingled transversely so as to remind one of that article of dry-goods which the ladies call rep; while the bands which commenced on the front wings above, may be traced further across the wing, and there is a transverse band on the hind wings, with an indistinct white spot near

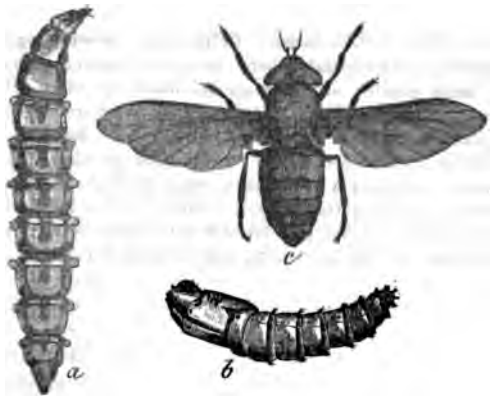
the upper edge. The female (Fig. 96), is of a lighter color than the male, marked with purplish-brown as in the figure, the transverse bands being quite distinctly defined with very dark-brown. The under side is very much as in the male.

A few of the butterflies, in all probability, manage to live through the winter, and are thus enabled to perpetuate the race, by depositing their eggs, the following summer, on the leaves and stems of the Boat-weed, which is the only plant upon which the insect is yet known to subsist.

THE BLACK BREEZE-FLY—*Tabanus atratus*, Fabr.

(Diptera, Tabanidæ.)

[Fig. 97.]



There is a family of large Two-winged Flies, commonly called Breeze-flies in England, but more commonly known as Horse-flies in this country, the insects belonging to which are, in the perfect state, great nuisances, though there is every reason to believe that as larvæ they are beneficial to the husbandman, by devouring many noxious underground vegetable-feeding larvæ.

This family comprises some of the very largest flies, and they are all noted for the tormenting powers which the female has of piercing the skin and sucking the blood of different quadrupeds and even of man. They are widely distributed, and species occur in all parts of the world, torturing alike the huge elephant and fierce lion of the tropics, and the peaceful reindeer of the arctic region. It is during the hottest summer months that they "do most abound," and they frequent both our timbered and prairie regions. One of the most common species in the West is the so-called "Green-head Fly" (*Tabanus lineola*, Fabr.) and every farmer who has to work on the prairies, especially during the hay-making season, knows how blood-thirsty it is, and how absolutely necessary it is to cover the horses at this season of the year, in order that they may be able to work at all. Two other species of nearly the same size (*T. costalis*, Wied. and *T. cinctus*, Fabr.) are common with us, and I have found the striped

Chrysops (*Chrysops vittatus*, Wied.)—a smaller yellow species with black stripes, and a broad smoky band across the middle of each wing; to be very troublesome in our wooded regions, confining its attacks more especially to the horses' ears, from which habit it is frequently called the "Ear-fly."

It is only the female flies, as is the case also with our mosquitoes, which thus torment our animals by means of their sharp lances, the males living on the sweets of flowers, and their mouths being destitute of mandibles. The flight of these Breeze-flies is very strong and rapid, and is attended with a buzzing, tormenting noise. The males may often be seen with the wings vibrating so rapidly that they become invisible, resting motionless in one place, and then darting rapidly and resting suddenly again, generally turning the head in some other direction each time they dart; and St. Fargeau has ascertained that this manœuvering is performed in order to intercept and seize the females.

Although these flies swarm so prodigiously on our prairie and especially on our low swampy lands, yet hitherto very little has been known of their larval character and habits. De Geer very many years ago described the larva of the European Cattle Breeze-fly (*Tabanus bovinus*, Linn.), and up to 1864 this was the only larva of the kind known. In February of that year Mr. Walsh published the description of another Tabanide larva, but without being able to refer it to any particular species.* I had the good fortune last summer to breed to the perfect state the very same kind of larva which Mr. Walsh described. It proved to be one of our most common and largest species, namely The Black Breeze-fly (*Tabanus atratus*, Fabr.) This Fly (Fig. 97, *c*) is black, the back of the abdomen being covered with a bluish-white bloom like that on a plum; the eyes are large, and the wings are smoky dark brown or black.

The larva (Fig. 97, *a*) is a large 12-jointed, cylindrical affair, tapering at each end, of a transparent, highly polished, glassy, yellowish or greenish appearance, shaded with bluish-green and furnished above and below, as in the figure, with large roundish sponge-like tubercles which are retracted or exserted at the will of the insect. Though the external integument is so transparent, that the internal structure is readily visible, yet this integument is firm and the larva is most vigorous and active, burrowing with great strength either backwards or forwards in the earth, and between one's fingers while it is being held. Placed in water it will swim vigorously by suddenly curling round and lashing out its tail, but it is apparently not as much at home in this element as in the wet earth, for it is restless and remains near the surface, with the tip of the tail elevated in the air. When the water is foul it moves about actively near the surface, but when it is fresh it remains more

*Proc. Bost. Soc. Nat. Hist., Vol. IX, pp. 302-6.

quiet at the bottom. The specimen which I succeeded in breeding, was sent to me by Mr. Adolph Engelmann of Shiloh, St. Clair Co., Ills. It was found by Mr. Wm. Cooper of the same county, about ten feet from a small but permanent stream of water. Mr. C. at first took it to be a leech, and when he attempted to capture it, it immediately commenced burrowing in the ground.

Mr. Walsh's description of this larva is so full, and agrees so well with mine, that I cannot do better than transcribe it.

TABANUS ATRATUS.—*Larva*,—Length 2.25 inches when extended, 1.75 inches when contracted; diameter .25—.30 inch. Body cylindrical, 12-jointed, the three or four terminal joints much tapered at each end of the body, but more so anteriorly than posteriorly, and joints 1 and 11, each with a retractile membranous prolongation at tip. Joints 1 to 10 are subequal; 11 is about two-thirds as long as 10 and 12 about one-fourth as long, and .05 inch in diameter. [Joints 1 and 12 pear-shaped when extended]. Color a transparent greenish-white, paler beneath; an irregular dark-green or greenish-black annulus, paler beneath, on the anterior and posterior margins of joints 2 to 11, the anterior annulus laterally connected with the posterior by two to four dark-green dines. On the dorsum of 4 to 9, and more obscurely on 10, a dark-green basal triangle, extending half-way to the tip; joint 1 with paler markings, and with no dark annulus behind; joint 12 entirely fuscous. Head small, apparently fleshy, pale, truncate-conical, .03 inch wide, and about .04 inch long in repose, inserted in joint 1 without any shoulder. The trophi occupy two-thirds of its length, but it has a long cylindrical internal prolongation, extending to the middle of joint 2, which is sometimes partially exserted, so that the head becomes twice as long as before. All the trophi are pale and apparently fleshy, except the mandibles, which are dark-colored and evidently horny, and they have no perceptible motion in the living insect. The lubrum is slender, a little tapered, and three times as long as wide, on each side of and beneath which is a slender, thorn-like, decurved, brown-black mandible. The labium resembles the labrum, but is shorter, and on each side of it is a slender palpiform, but exarticulate maxilla, extending beyond the rest of the mouth in an oblique direction. No palpi. On the vertex are a pair of short, fleshy, exarticulate, filiform antennæ, and there are no distinct eyes or ocelli. In the cast larval integument the entire head, .25 inch long, is exserted, and is dark-colored and evidently horny, all the parts retaining their shape except the antennæ, labrum and labium. The whole head has here the appearance of the basal part of the leaf of a grass-plant, clasping the origin of the maxillæ on its posterior half, and bifurcating into the somewhat tapered cylindrical mandibles on its anterior half. The maxillæ are traceable to two-thirds of the distance from the tip to the base of the head, scarcely tapering, bent obliquely downwards at two-thirds of the way to their tip, and obliquely truncate at tip. On the anterior margin of ventral segments 4—10, in the living insect, is a row of six large, fleshy, roundish, tubercular, retractile pseudopods, the outside ones projecting laterally, and each at tip transversely striate and armed with short, bristly pubescence; on the anterior half of ventral joint 11 is a very large, transversely-oval, fleshy, whitish, retractile proleg, with a deeply impressed, longitudinal stria. On the anterior margin of dorsal joints 4—10, is a pair of smaller, transversely-elongate, retractile, fleshy tubercles, covering nearly their entire width, armed like the pseudopods, but not so much elevated as they are. No appearance of any spiracles. Anus terminal, vertically slit with a slender, retractile thorn .05 inch long, not visible in one specimen. Head, and first segment or two, retractile.

The larva reared by De Geer was terrestrial. This larva is semi-acquatic, for it is quite at home either in water or moist earth. My specimen was kept for over two weeks in a large earthen jar of moist earth well supplied with earth-worms. It manifested no desire to come to the surface, but burrowed in every direction below. I found several pale dead worms in the jar, though I cannot say positively whether they had been killed and sucked by this larva. Mr. Walsh in speaking of its haunts and of its food, says: "I have, on many different occasions, found this larva amongst floating rejectamenta. On one occasion I found six or seven specimens in the interior of a floating log, so soft and rotten that it could be cut like

cheese. Once I discovered a single specimen under a flat, submerged stone, in a little running brook. And finally, I once met with one alive, under a log, on a piece of dry land which had been submerged two or three weeks before, whence it appears that it can exist a long time out of the water. I had, on several previous occasions, failed to breed this larva to maturity, and the only imago I have, was obtained in 1861, from larvæ, which, suspecting them to be carnivorous from the very varied stations in which they had occurred, I had supplied with a number of fresh-water mollusks, but the habits of which, in consequence of having been away from home, I was unable to watch. On September 2d, 1863, I found a nearly full-grown larva amongst floating rejectamenta, and between that date and September 23d, he had devoured the mollusks of eleven univalves (*Gen. Planorbis*) from one-half to three-fourths of an inch in diameter; and on three separate occasions I have seen him work his way into the mouth of the shell. In this operation his pseudopods were energetically employed, and I found, on cracking the shells after he had withdrawn, that a small portion of the tail end of the animal was left untouched—no doubt in consequence of his being unable to penetrate to the small end of the whorl of the shell—and also the skin of the remaining part, and the horny-tongued membrane."

My larva transformed to pupa (Fig. 97, *b*) within the ground, during the fore part of July; it remained in this state but a few days, and the fly issued July 13th, and soon made its presence known by its loud buzzing inside the jar. It was a perfect ♀ specimen, and the pupal integument was sufficiently firm and polished, that by carefully washing off the earth, an excellent cabinet specimen was obtained, which retained almost the exact form and appearance of the living pupa. Before the escape of the fly which was effected through a longitudinal fissure on the back of the head and thorax, reminding one of the mode of escape of our Harvest-flies (*Cicadæ*), this pupa by means of the thorns with which it is furnished, had pushed itself up to the surface of the earth. My specimen being female, may account for the very slight difference between the following description and that of Mr. Walsh's.

Pupa, (described from pupal integument).—Cylindrical, lying curved as in the figure; rounded at the head, and tapering at the last two joints; pale semi-transparent yellowish-brown. *Head* with two transverse, narrow-edged, somewhat crescent-shaped dark-brown projections representing the mouth, two rounded tubercles above, on the front, of the same color, and each giving out a stiff bristle; and midway between these four, two much smaller, lighter, rounded tubercles, set closer together; on each side in a line with the upper tubercles, a wrinkled antenna, trigonate at base, appressed to the surface and pointing outwards; below these antennæ, on the eyes, two small bristled warts. *Thorax*, pronotum commencing behind antennæ, with a pair of small bristled brown tubercles* on its anterior dorsal submargin; mesonotum twice as long as pronotum, with a pair of large obliquely-placed, reniform, purple-brown tubercular spiracles, bordered on the outside above, with a distinct fine white line; between these spiracles are four small brown elevations the two middle ones quite small and close together; a short metanotal piece, about one-seventh as long

*Evidently not spiracles as Mr. Walsh supposed. The mesonotal spiracles are well defined, with the white border above mentioned, and the abdominal spiracles are each marked behind by a distinct white line; but these tubercles have no such annulus and are illy defined.

as pronotum and without spiracles. *Abdomen*, with 8 subequal segments, with two well defined lateral impressed lines, and all but the last bearing between these lines, a rounded brown tubercular spiracle, the posterior upper borders lined with white. The first segment is simple and extends to the tips of the wing-sheaths; the others are all furnished, on the posterior one-third, with an annulus of fine, yellowish bristles, depressed and directed backwards. Anal thorn robust, yellow, truncated, and furnished with six stout brown thorns, hexagonally arranged. Length 1.20 inches; greatest diameter 0.30 inch. One ♀ specimen.

This large Black Breeze-fly does not attack horses to any considerable extent that I am aware of, but is said to bite cattle. The smaller species of real Horse-flies mentioned above, and which occur in prodigious numbers on our Western prairies, away from any large streams of water, must evidently be terrestrial in the larva state, and not aquatic, and must just as surely live on other food than snails, which are quite rare on the prairies. They are certainly carnivorous however, and it is but natural to suppose that they feed on underground vegetable-feeding larvæ, such as the different kinds of white grubs, the larvæ of Crane-flies (*Tipulidæ*), etc. Thus, in all probability, they perform a most important part in the economy of Nature, by checking the increase of those underground larvæ which are the most unmanageable of the farmer's foes. They therefore partly atone for the savage and blood-thirsty character of the perfect females, and I prefer consequently to place them with the other Innoxious Insects.

GALLS MADE BY MOTHS.

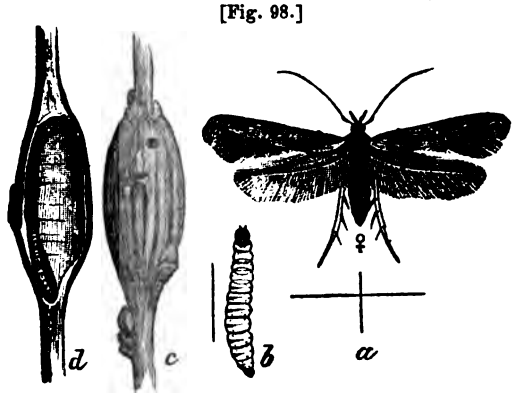
As a sequence to the article on the Solidago Gall Moth (*Gelechia gallæsolidaginis*, Riley) published in my former Report, I will here describe two other gall-making moths, with which I was not then acquainted, the first of which, as I have since ascertained, occurs in this State. The other I have never yet met with.

THE FALSE INDIGO GALL-MOTH—*Walshia amorphella*, Clemens.

(Lepidoptera, Tineidæ.)

On the leafless stems of the False Indigo (*Amorpha fruticosa*) may often be seen, during the fall, winter and spring months, an elongated swelling such as that shown at Figure 98, *c*, two of them often occurring one above the other. This swelling is a simple enlargement of the stem to five or six times its natural diameter, and measures from three-quarters of an inch to an inch in length. If cut open during any of the winter months, the interior will present a tough woody appearance, with an irregular brown channel, almost always

[Fig. 98.]



at one side of the gall, and communicating above with a small closed-up tubercle (See Fig. 98, *d*,). At the bottom of this channel the larva (Fig. 98, *b*, enlarged), which is whitish with a conspicuous black head and black collar, may always be found, and it does not transform to the chrysalis state till a few weeks before appearing as a moth. The tubercle near the top of the gall is evidently caused by the young larva penetrating the stem when it first hatches out; and this larva must, after it has burrowed the proper length down the stem, turn round and widen the burrow right up to the point of entrance; for it is from this point that the moth escapes in the spring. The moth, of which Figure 98, *a*, represents an enlarged female, is easily distinguished from most other small moths belonging to the same family (*Tineidæ*) by its beautifully tufted front wings, which are not easily represented in a wood-cut. It is of a yellowish-brown color, marked with darker brown, and the males are generally a little darker than the females. This little moth was first described by Clemens (Proc. Ent. Soc. Phil., Vol. II, p. 419), who named the genus in honor of Mr. Walsh, its first discoverer, and so far as I am aware it is the only representative of the genus.

The twigs invariably wither and dry up above this gall, but as the shrub has no particular value, the little gall-maker may be placed among the harmless insects.

WALSHIA AMORPHELLA—*Larva*—Length 0.35—0.40 inch. Cylindrical, tapering each way, but more especially towards anus. Yellowish-white, each segment with about two distinct transverse folds. Two dorsal rows of pale but polished piliferous spots, two to each segment; stigmata round, jet black with a white centre, with a pale piliferous spot above, and two contiguous ones on a lateral fold, below each; on joints 1 and 2 the folds are more numerous and the piliferous spots are larger and arranged in a transverse row. Head either black or dark brown, the trophi except the maxillæ white, and the eyelets, arranged in a crescent, also pale. Cervical shield same color as head, divided in the middle by a distinct pale line. Both have a few white hairs, arising from pale points. Anal shield small and brown. Thoracic legs pale but slightly horny, transparent, furnished with hairs, and with two basal semi-circular brown lines behind, the largest terminating on the inside, in a black thorn. Prolegs very small and scarcely distinguishable except by a faint brown circular rim at extremities, and a still fainter one at their base. Described from numerous specimens, all very uniform.

Pupa—Unknown.

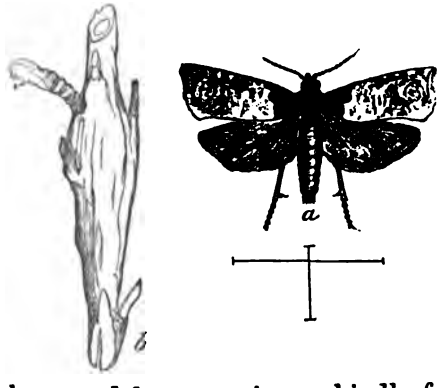
Moth—Front wings yellowish-fuscous, with a rather large blackish brown patch at the base of the wing, somewhat varied with spots of the general hue, and a blackish-brown tuft, having the scales directed toward the tip of the wing, on the basal third of the fold, and a smaller one above it near the costa. Near the end of the fold is another small tuft of the general hue, having the ends of the scales tipped with dark brown, and in the middle of the wing nearly adjoining the latter is a large tuft of the general hue. Above the end of the fold is a small blackish-brown tuft, the scales of which are not so much erected as in the other tufts; between this and the central tufts is a blackish-brown patch which sends a streak of the same hue into the fold. The apical portion of the wing is somewhat discolored with brown, and along the inner margin, at the base of the cilia, are five or six black dots. Cilia dull testaceous. [Hind wings shiny yellowish-brown, long, narrow, lanceolate, with very long cilia] Antennæ fuscous [the basal joint long, smooth and clavate]. Head and thorax blackish-brown; labial palpi yellowish-fuscous. [Abdomen above dark brown, the joints bordered behind with gray, the terminal joint with a yellow tuft. Legs short, the tarsi only of hind pair reaching beyond abdomen; marked with gray and brown. Under surface uniform grayish-brown, the hind wings somewhat paler, and all the wings bordered with a paler line. Length 0.20; alar expanse 0.53 inch.] (After Clemens).

THE MISNAMED GALL-MOTH—*Euryptychia, saligneana*, Clemens.

(Lepidoptera, Tortricidæ.)

The only other gall-producing moth known in this country is the species illustrated herewith (Fig. 99, *a*), and there are some doubts in my mind as to whether it is a real gall-maker or an "inquiline" or intruder on my true Solidago Gall-maker (*Gelechia gallæsolidaginis.*) But two specimens of the moth have ever been found, one of which is in the cabinet of the late Brackenridge Clemens, at Philadelphia, and the other in my possession. They were both bred by Mr. Walsh from golden rod galls resembling those of my Solidago gall in being elongated and hollow; and from specimens kindly furnished to me before his death, I am enabled to give the above sketch of the dried gall, with the pupa-skin attached, and likewise that of the moth. The only description which exists of the larva is of a dead and somewhat shrunken specimen, in the following brief note taken from Mr. Walsh's journal: "Larva 16-footed, yellowish; spiracles (fuscous) on all but 2d, 3d and anal segments. Head and 2d [1st] segment horny and rufous. Length 0.40."

[Fig. 99.]



The moth is the only representative of its genus (*Euryptychia*) so far known. It was described in 1865 by Dr. Clemens * as *E. saligneana*, under the false impression that it was reared from a willow gall. But the scientific name of the insect must stand, however inappropriate.

EURYPTYCHIA SALIGNEANA—*Moth*—Front wings white, tinted with yellowish. The basal patch is dark brown. The wing beyond the basal patch is nearly white, varied with leaden-colored speckles and striped over the nervules with dull, leaden-gray, transverse stripes, two of which near the anal angle form a white ocelloid patch. Immediately interior to the ocelloid patch is a small black spot, having a line of black atoms running into it, from above and beneath. Below the apex, on the hind margin, is a triangular brown patch, which is varied with grayish and dotted with black in the middle and along the inner edge. The costa is geminated with white, and striped with brown. Hind wings dark fuscous. (After Clemens.)

Generic character—Hind wings broader than front wings. Costal and subcostal veins with a common origin; branches of subcostal connivent. Median vein 4-branched, three of which are aggregated, the two central ones from a common base. Front wings *with a broad fold*, extending to the middle of the costa, closely appressed; at least three times longer than broad; costa straight, tip moderately acute, apical margin rounded. The nervules given off from the posterior end of the cell are bent toward each other or are somewhat aggregated.

Head smooth, with ocelli at base of antennæ. Antennæ filiform, simple. Labial palpi, *do not exceed the face*, are curved, smooth, rather slender, expanded toward the tip, the apical joint scarcely perceptible, except in front. (Clemens.)

My reasons for thinking this insect an intruder on the rightful gall-maker, are: 1st, because if it were a true gall-maker we should

* Proc. Ent. Soc., Phil., V., p. 141.

naturally expect to find its gall more common; 2d, because on several occasions I have found within the *Gelechia* gall, a pale worm very different from the true gray gall-making larva. But until more decided proof can be obtained, and until the fact is settled by further experience and experiment, we must, from such evidence as we have, consider the Misnamed Gall-moth, a true gall-maker.

Thus we have three different and distinct gall-moths in this country, belonging to two distinct families and three distinct genera; while a fourth (*Cochylis hilarana*) belonging to still another genus is known to form a gall on the stems of *Artemisia* in Europe. It is very manifest that all of these galls are formed by the irritating gnawings of the larva after it is hatched, and not induced by any poisonous fluid injected with the egg by the ovipositor of the parent, as is demonstrably the case with those galls which are produced by gall-flies (*Cynips* family), and with such as are produced by some gall-making Saw-flies. It is not at all improbable, however, that these moth larvæ do in reality secrete from the mouth some peculiar fluid which tends to produce the gall; for we know that very many other moth larvæ burrow in the stems of different plants without producing any abnormal swelling.

ERRATA.

Page 13, line 25, for "cupable" read "culpable."
Page 16, line 13, for "lava" read "larva"
Page 23, line 6 from bottom, for "hole" read "holes."
Page 32, line 17, for "insect" read "insects."
Page 50, line 4 from bottom, for "*leucaia*" read "*leucania*."

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